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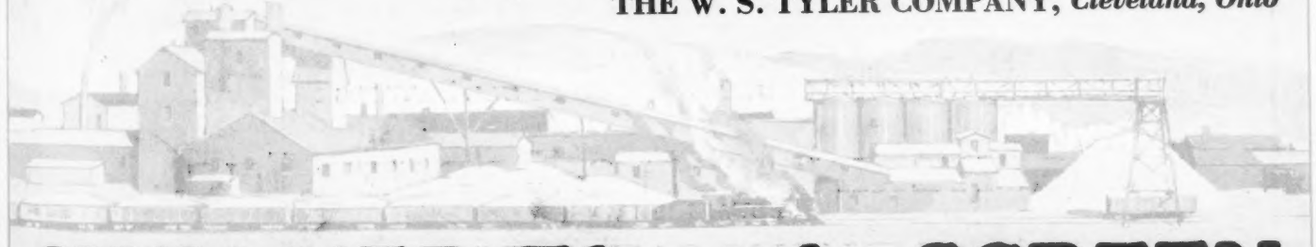

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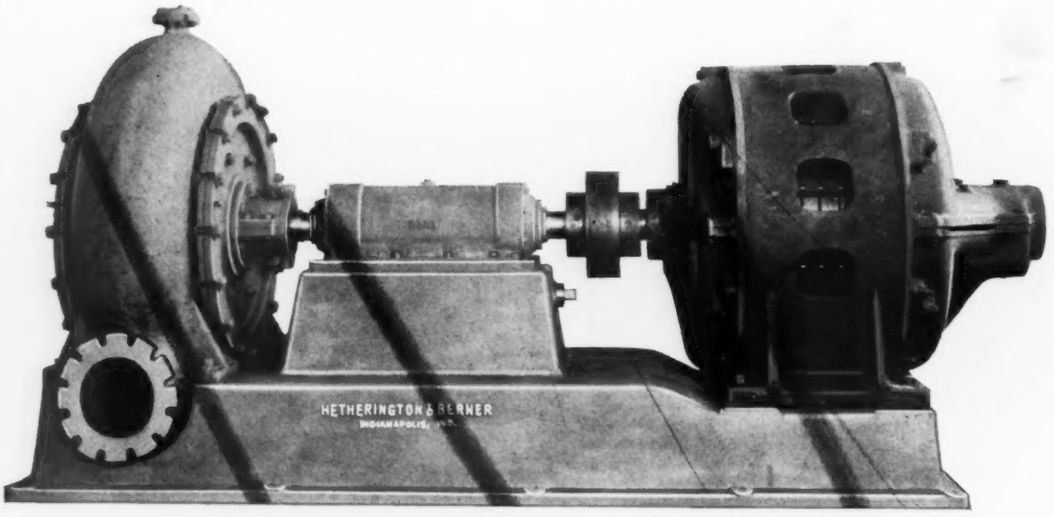

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Vol. XIX CHICAGO, JANUARY 15, 1930 No. 8

Transit-Mix Concrete Corp. Solves Many Problems In Marketing of Concrete in New York City

Waterfront Plants So Located as to Serve Economically All Sections of the Metropolitan District

By W. E. TRAUFFER

THE Transit-Mix Concrete Corporation of New York City operates a number of strategically located plants which furnish most of the commercial ready-mixed concrete for the metropolitan area. The first of these plants is at 70th Street and the East River. Others are at Franklin Street and the North River, 29th Street and South River, and 54th Street and the North River in Manhattan, and 165th Street and the Bronx River in the Bronx. Several others are planned which will be built at the foot of Cort Street, Brooklyn, and at the foot of Broadway, Astoria, L. I. With the present plants the company is able to serve economically all of Manhattan south of 125th Street.

The growth of this company since the first plant went into operation in June 1927 has been extremely rapid. About 20,000 cu. yd. of concrete were produced in 1927. During the same period in 1928 over 40,000 cu. yd. were produced and indications are that 1929 showed an even greater increase over 1928.

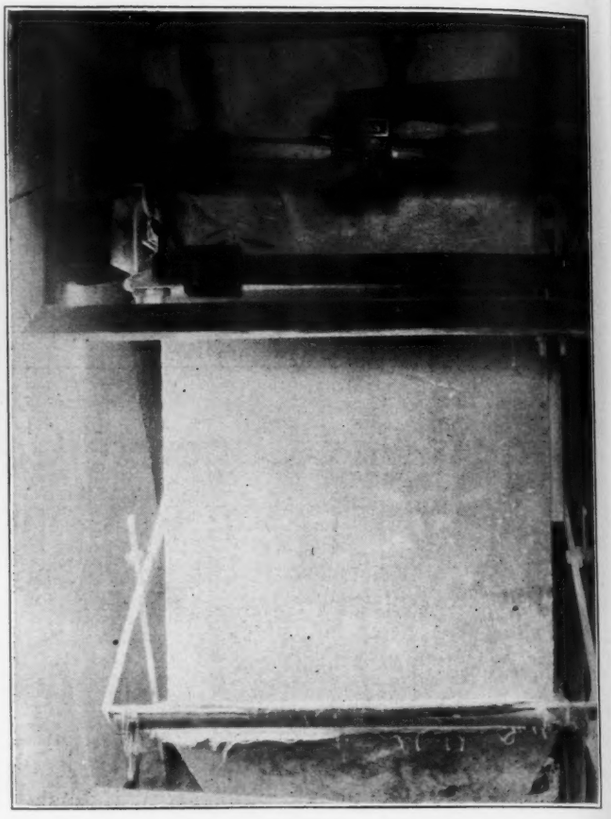
All of the plants with the exception of the one at 70th Street and the East River are dry-batching plants of the same general type of construction. All have water-front locations and receive their

The 54th St. plant at right showing loaded truck on way to job. Stiff-leg derrick in background discharging to stockpile

Truck discharging concrete for new subway in Manhattan

materials by barge from the most convenient sources. They were designed by the company's engineers in collaboration with the Blaw-Knox Company, which furnished the steel bins and weighing batchers. All of them have concrete foundations, structural steel framework and heavy gauge metal siding and roofing. As they all use the same methods of unloading and handling materials, a description of one will suffice for all of them.

The Franklin Street plant unloads sand and gravel and crushed stone from barges at the dock by means of a stiff-leg derrick handling a 2-cu. yd. Hayward clamshell bucket. This discharges into a Blaw-Knox 4-compartment, 350-cu. yd. capacity steel bin at the top of the plant. The derrick is operated by a National Hoisting Engine Company 3-drum, 10-in. by 12-in. steam hoist. A smaller hoist of the same make swings the boom. Sacked



Cement batcher and scale at Franklin St. plant

cement is unloaded from barges and trucked into the cement storehouse. The sacks are opened and the cement dumped into a Chain-Belt, steel-enclosed bucket elevator which discharges into a 50-bbl. capacity steel bin above the plant.

The sand, gravel and cement discharge through rack and pinion selective gates into two Blaw-Knox

Franklin St. plant from water side showing stiff-leg derrick handling aggregate from barge to bins

A. G. Gull, general manager, at left, with Geo. Sampers, superintendent at Franklin St.

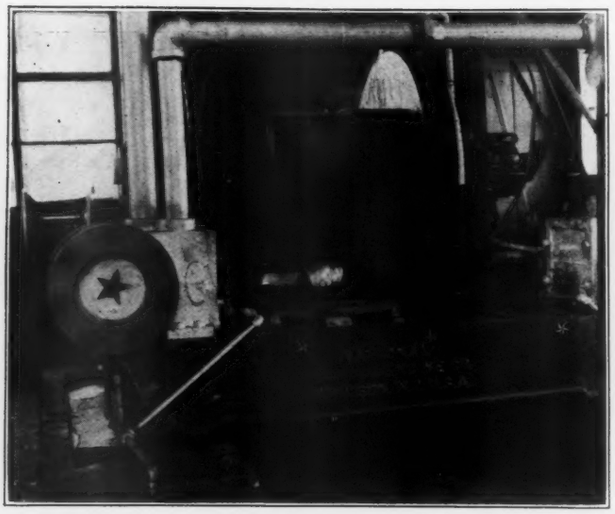
Truck loading at one of plants; body revolving to insure good dry mix

weighing batchers. A shaft with two blades in the cement bin is used to prevent sticking. The cement batcher has a capacity of 3,000 lb. and the aggregate batcher of 16,000 lb. Both are equipped with Fairbanks beam scales, the sand and gravel scale also having a dial to speed up operations.

The batchers discharge through a special movable spout which feeds the trucks. This spout is so designed that it mixes the various ingredients as they leave the batchers. Water is measured by a 250-gal. capacity Blaw-Knox water-measuring tank through a quick detachable connection into a tank on the truck. The measuring tank has both a calibrated volume water glass and a weight scale to insure accurate measurement. The entire operation of loading a 5-cu. yd. truck takes from 1½ to 2 min. Each plant has a small laboratory with facilities for making sand and gravel tests and slump tests of the concrete.

The trucks used for delivering and mixing the concrete have bodies made by Transit Mixers, Inc. Mixing is done either in transit or on arrival at the job by a revolving drum and blade arrangement. By revolving the drum while loading and in transit a complete dry mix is secured. Water is then added from the dual-compartment tank and the final mix secured. The body is hoisted to the dumping position by the truck's own motive power giving controlled or instantaneous discharge as desired.

Some of the company's transit-mixing trucks lined up



Hoist and engine which operate stiff-leg derrick at one of the plants

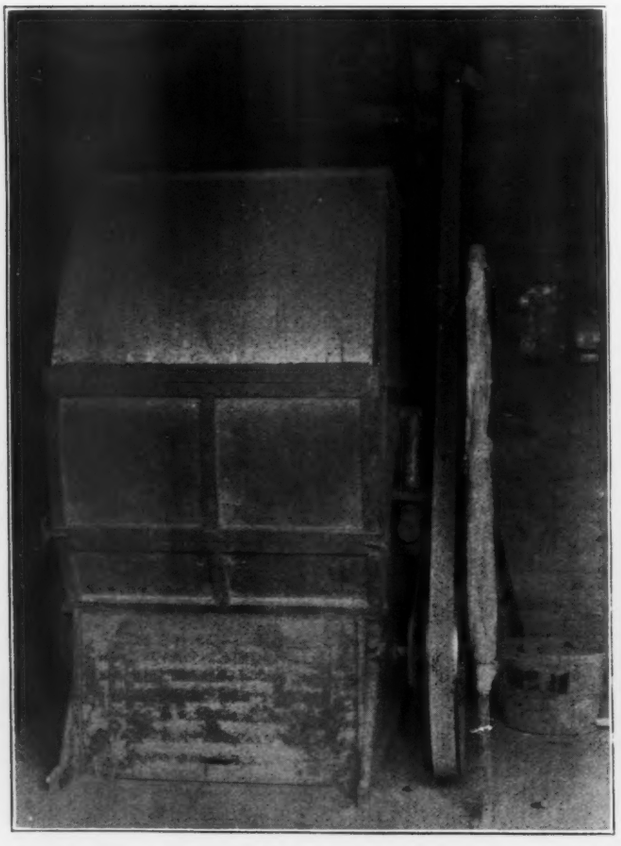
The company garage at 18th St. where all of the trucks are housed

Forty of these are now in use at the various plants, all having 5-cu. yd. bodies, except three which are 3½-cu. yd. The smaller trucks were first used but loss of time due to traffic congestion made the transportation costs so high that it became necessary to use larger trucks. Mack chassis are used exclusively. The company maintains a spacious and completely equipped garage where the trucks are housed and serviced.

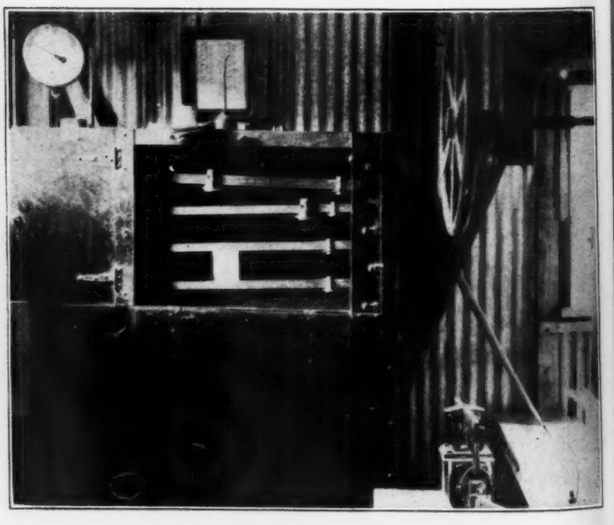
The type of work for which the concrete from the different plants is used varies considerably. The Franklin Street plant, for instance, is using most of its output for the new lower West Side subway now under construction. Other uses are for street, public utility and general building construction.

One of the problems confronting this company is the wide range of brands of cement and sizes of sand, gravel and stone which are specified by some users of concrete. To meet these requirements additional storage had to be provided for. Because of this variation in requirements and the fluctuation in demand from day to day, a wide margin of safety is necessary which greatly increases the overhead.

The main office of the Transit-Mix Concrete Corporation is at 551 Fifth Avenue. A. G. Gull is general manager in charge of operations, and J. H. Dixey is sales manager and engineer.



One of the rotary bag cleaners of the type used at all of the plants



The sand and gravel batcher scales at Franklin St.

Trinity's Cement Plants at Dallas and Fort Worth Each Has Capacity of 4,000 Barrels Daily

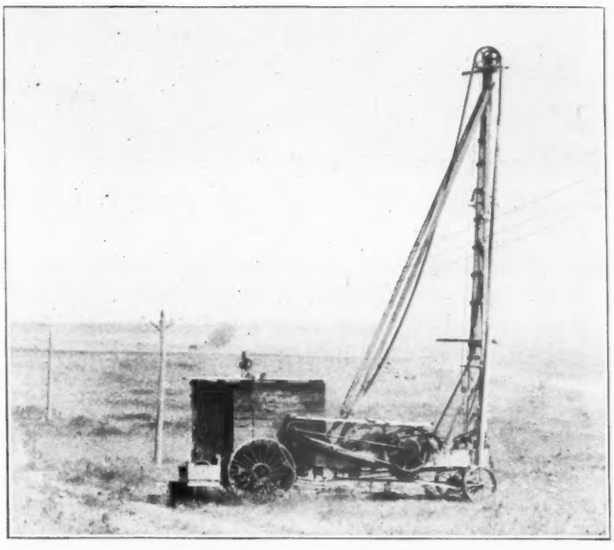
O. V. Bartholomew, General Superintendent, Designed Several Important Pieces of Equipment Used in Operations

By T. K. KNOX
Mining Engineer, Dallas, Texas

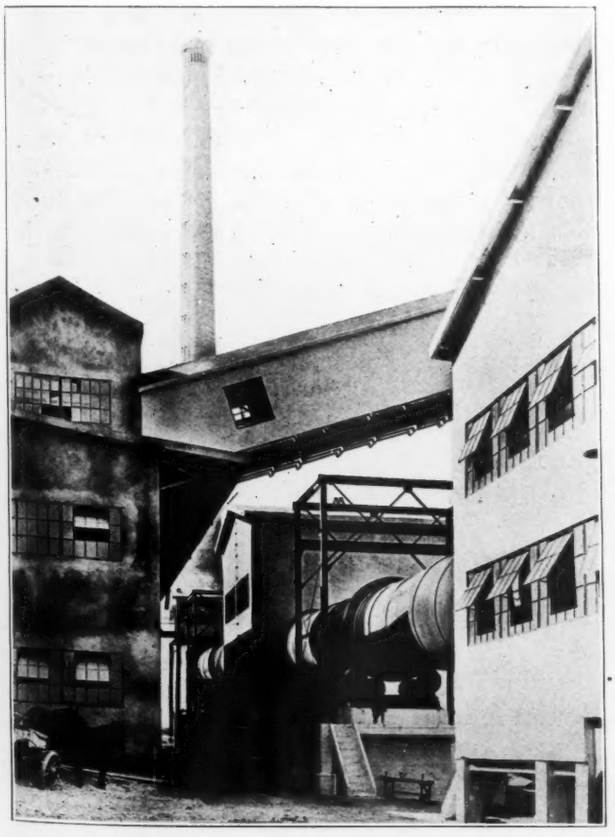
[This article, together with one which appeared in the last issue of PIT AND QUARRY, *describes the three Texas plants of the Trinity Portland Cement Company. The first installment dealt with the Houston plant, which utilizes the wet-process of manufacture. The Fort Worth and Dallas plants, the former wet-process and the latter dry-process, are described and illustrated in this conclusion.—Editor.]*

The Fort Worth Plant

ANOTHER efficiently-designed, modern wet-process plant of the Trinity Portland Cement Company is located just north of Fort Worth, Texas. The plant was built in 1924-1925 and began operating in May, 1925. There was originally but one kiln—now there are two. One raw grinding and one finishing mill were first installed. Since then, however, three more have been added, one raw mill and two additional for the finish grind. These improvements were made in 1928, doubling the capacity of the plant to its present 4,000-bbl. daily production. The plant functioned efficiently from the start, and even when the capacity was doubled, no production was lost. The Meecham aviation field is located nearby and the two high stacks of the plant are illuminated at night to guide aviators to the flying field.



One of the large drills used by the Trinity Portland Cement Co.



The Fort Worth kiln and housed, inclined belt conveyor from grinding mills to silo storage

Quarrying

The quarry is located immediately north of the plant. A face about 30 ft. in height and approximately ¼-mi. in length has been opened where both limestone and shale are quarried. A Sanderson-Cyclone electric drill is used for drilling the blast holes, which are staggered about 10 ft. apart. A 50-B Bucyrus-Erie electric shovel mounted on caterpillar crawlers, with a 2-cu. yd. dipper, is used for loading the material into cars after it has been blasted down.

The Woodford haulage system is employed to handle the rock from the quarry to the plant. This system embodies the use of individual electric motor-driven dump-cars, operated singly. All car movements, including dumping, are handled by a single operator in a control tower. Track is of standard gauge, and the cars are sometimes used to switch railroad cars about the plant. From the tower, the operator has complete control of all cars, the quarry and cars being in full view of the oper-

This hopper feeds rock to a pan conveyor which, in turn, feeds the crusher at the Fort Worth plant

Shovel and quarry car at Fort Worth plant

ator. One track runs along the quarry face, where cars are loaded by the Bucyrus shovel and are run to the crusher. Empty cars are looped back over another track for loading.

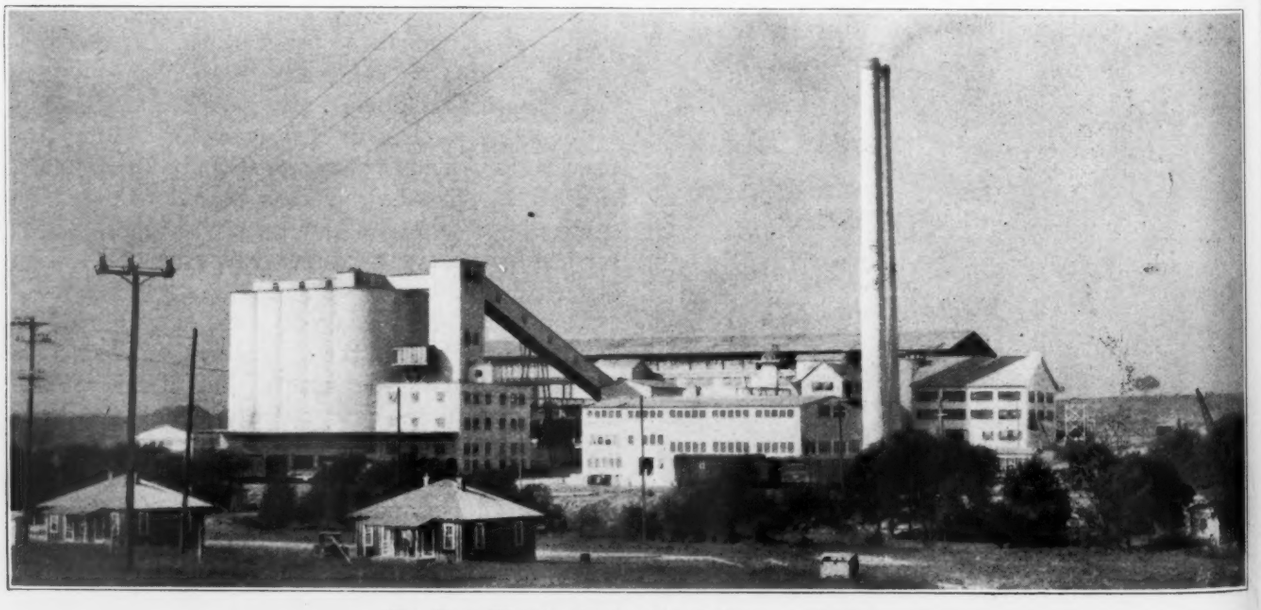
Crushing

The cars dump into a steel-lined hopper, 18 ft. by 20 ft. in size, from which the material is fed into a No. 7 Williams Mammoth hammer-mill. This is the only crusher in the plant and is used for both shale and limestone. The crusher is driven through a flexible coupling by a 250-hp. General Electric motor. A pan-type feeder, driven by a 5-hp. General Electric motor, is employed. A Link-Belt pan conveyor carries the broken material from the crusher to the rock storage. The storage house is composed of concrete walls with structural-steel framework overhead supporting the roof. A craneway extends 360 ft., the entire length of the structure, a 16-ton Shepard traveling crane equipped with a 4-yd. clamshell bucket, handling the materials. The crane has a span of 75 ft. The storage house is divided into compartments, for both raw material and finished product. Gypsum is unloaded from cars and is handled by the crane into storage. From storage, the crushed rock is handled by the crane into the hoppers of the raw grinding mill.

Raw Grinding

The tube mill where the raw grinding takes place is adjacent to the storage house. The two raw grinding mills are 8-ft. by 30-ft. Traylor combination mills.

Material is fed from the hoppers to the mills by Bartholomew feeders and Smidth table feeders. The Bartholomew feeder is the invention of O. V. Bartholomew, general superintendent of the company. It is a roll-type feeder and has been in successful use for many years. The mills are driven by 700-hp. General Electric super-synchronous motors. From the raw grinding mills, the slurry flows by gravity to two 6-in. Morris pumps, driven



The Fort Worth plant, viewed from northeast

in tandem by a 30-hp. General Electric motor, where it is pumped to six mixing tanks.

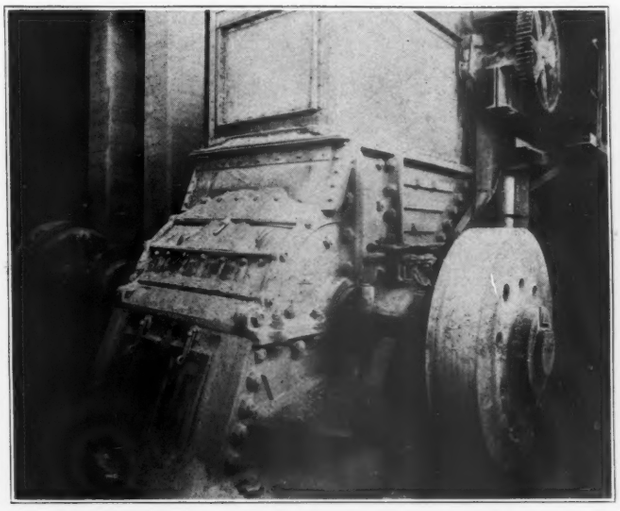
Slurry Mixing and Correction

The tanks are of the silo-type, each 16 ft. by 38 ft. in size. The mixing tanks are agitated both by air and mechanically. The mechanical agitators were made by the Bethlehem Foundry and Machine Company. Each agitator consists of a shaft with blades set at an angle. Two Westinghouse 15-hp.

Showing loading of large rocks which go to the crusher in the Fort Worth plant

motors drive the agitators through pinion gears and a Palmer-Bee speed reduction unit. From the mixing tanks a set of No. 5 Worthington pumps transfers the slurry to six mechanically-agitated correction tanks. These correction tanks are each 16 ft. by 30 ft. by 50 ft. in size. The slurry is next pumped from the correction tanks to two 20-ft. by 20-ft. kiln-feed tanks. These tanks have semi-spherical ends, are mechanically agitated, and are located immediately under the feed end of the two kilns.

The kilns are fed by a ferris-wheel type feeder, also designed by Mr. Bartholomew. The feeders



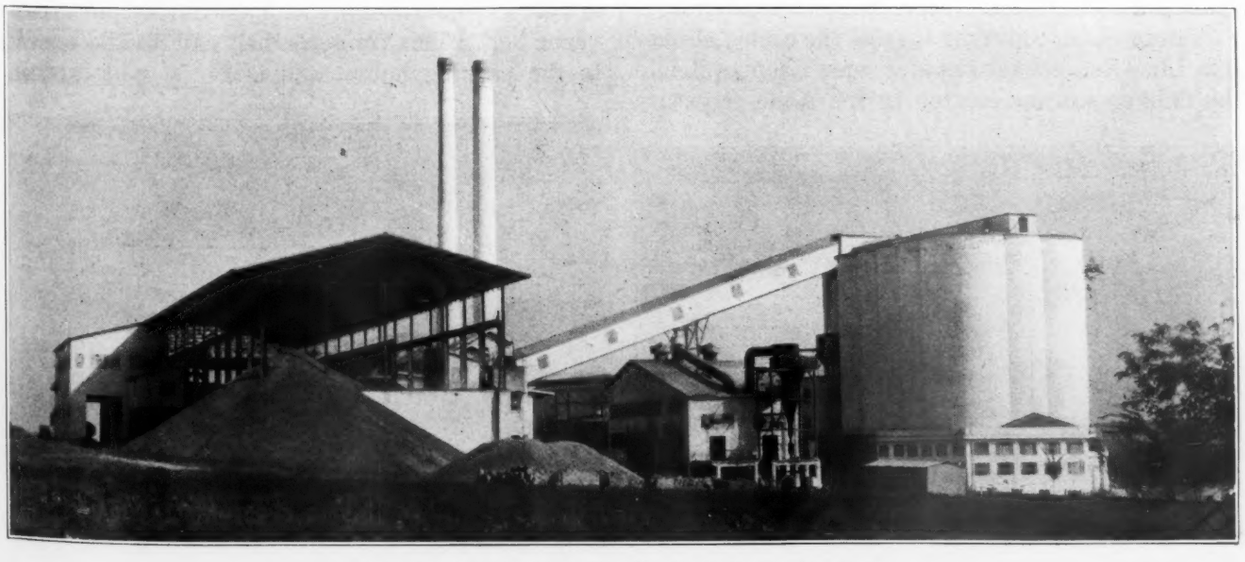
This huge unit is the only crusher in the Fort Worth plant

are driven by a 5-hp. General Electric motor through a Foote speed reducer.

Burning

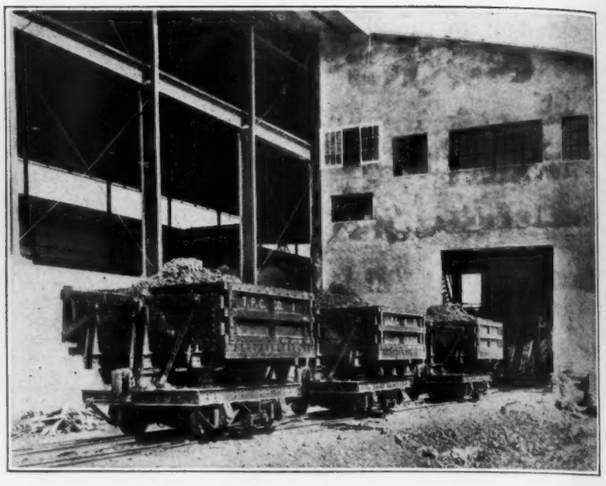
Burning takes place in two kilns, manufactured by The Reeves Bros. Company. One of the kilns is 11 ft., 3 in. in diameter for 70 ft. in the burning zone and 10 ft. in diameter for the remaining 180 ft. The second, and newer kiln, is 11 ft. 3 in. in diameter its entire length. Both are 250 ft. long. Each kiln is driven by a 125-hp. General Electric variable-speed motor through a Reeves speed reducer. The kilns are in the open except at the firing and feed ends.

Natural gas is used for fuel. A burner of the company's own design is used in firing each kiln. An American Blower fan exhausts the hot air and gases through a dust collector, returning them to the burners. Air is preheated to a temperature of over 600 deg. F. before going to the burners. Northern Blower Company Cyclone and Whirlwind



General view of Fort Worth plant from southeast

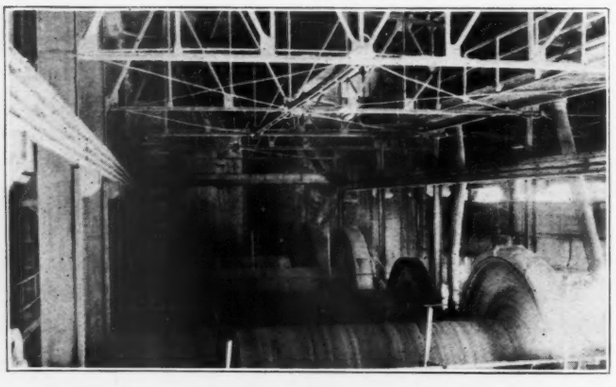
Closeup of crane and craneway in the Fort Worth plant



Loaded cars entering Fort Worth crushing plant. Note third rail in track. Craneway over rock storage at left

dust collections are used to clean the air used with the gas in firing the kilns.

Clinker from the kilns is cooled by an Allis-Chalmers 6-ft. by 50-ft. rotary cooler, and a Reeves 8-ft. by 50-ft. rotary cooler. The coolers are set parallel to and immediately under the kilns. The



Tube mills in Fort Worth plant grinding building

clinker also may be dropped into a tunnel below the kilns, instead of the coolers, if desired, and cooling accomplished by spraying with water.

A drag chain conveyor carries the cooled clinker to a Link-Belt bucket elevator which dumps it into the clinker storage located in the same structure

Gas burner as used at Fort Worth and Houston plants

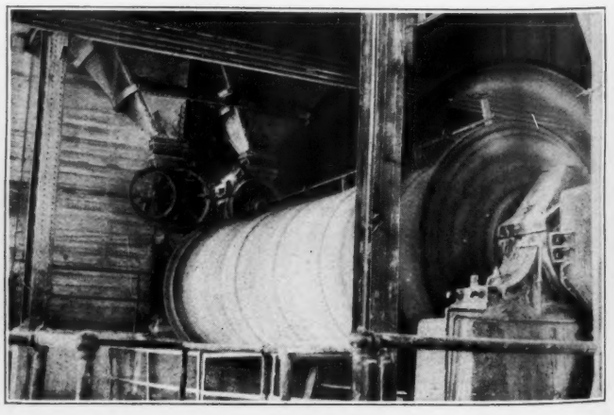
where the raw materials are stored.

The same crane which handles the raw material distributes the clinker in storage and handles it to the clinker hoppers of the finish grinding mills. Gypsum is reclaimed from storage by the crane to the gypsum hoppers of the finishing mills.

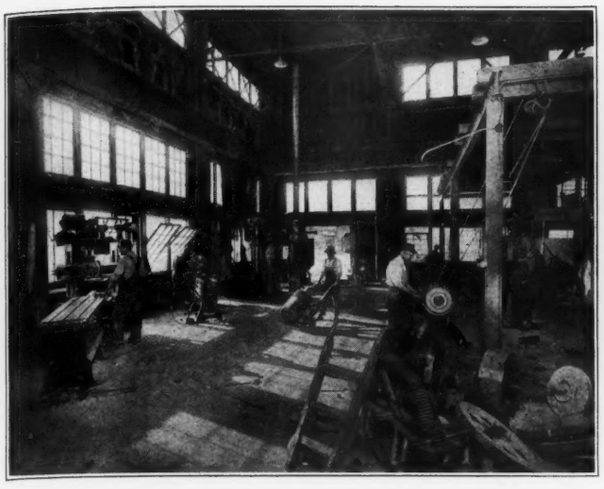
Finish Grinding

Three Traylor mills are used for finish grinding. Two are 7 ft. by 28 ft. combination mills and the other an 8-ft. by 30-ft. mill. The former are driven by 700-hp. General Electric super-synchronous motors and the latter by a 500-hp. motor of the same type and make. Two of the mills use Bartholomew feeders, and one uses a Smidth table feeder.

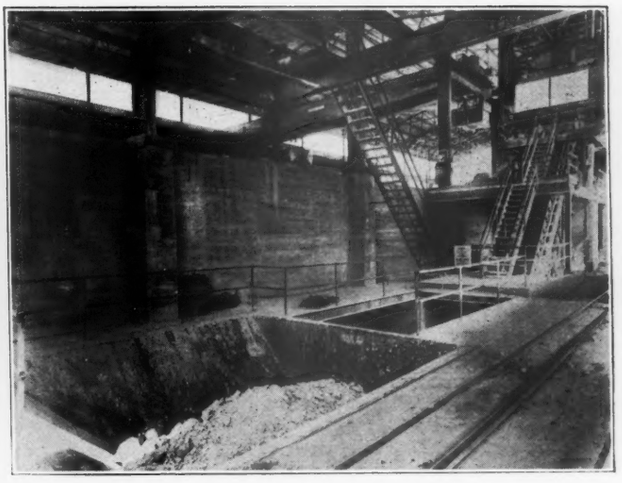
Finish grinding is carried to the point where 92 per cent of the material passes 200-mesh screen. From the finish mills, the cement flows by gravity to a 20-in. bucket elevator. This elevator, and the chutes leading to it, are enclosed so as to be dust-proof. The cement from the elevator falls into a hopper, equipped with a spout by which the cement is fed, through a Bartholomew feeder, to a conveyor belt. This conveyor belt carries the cement to the packing house, and is 24 in. wide and on



Bartholomew feeder and 7-ft. by 28-ft. mill in Fort Worth plant



Portion of machine shop, Fort Worth plant



Interior Fort Worth crushing plant showing craneway

200-ft. centers. The belt is enclosed in an inclined gallery, elevated about 15 deg. A Merrick Weightometer weighs all cement as it leaves the belt and enters the packing house. The cement is delivered from the inclined conveyor by cross-screw conveyors, either to the bins of the stationary packers or to the silos above the portable packers.

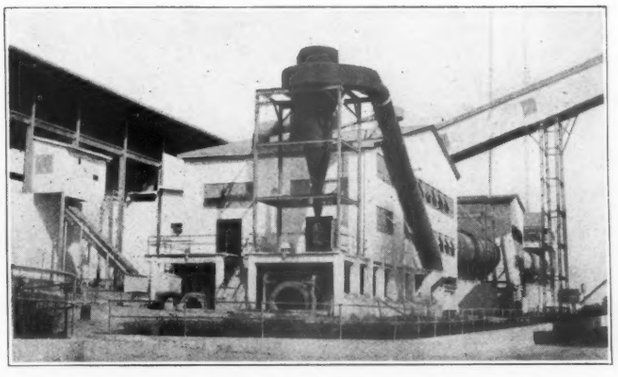
Storage and Packing

There are six cement storage silos, each 33 ft. in diameter and 85 ft. high, arranged to form two star bins and six outer bins.

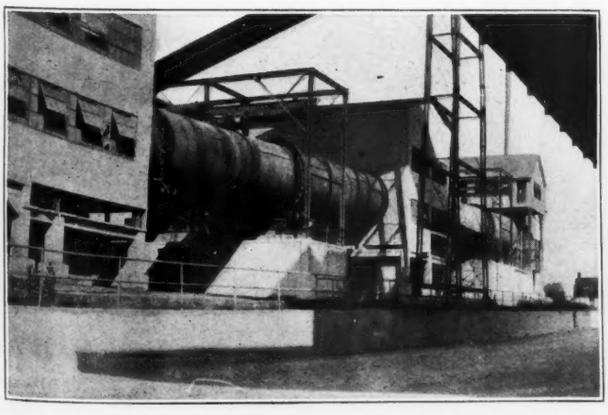
One of the interesting features of the plant is the packing house. The general plan was conceived by A. A. Chaney, superintendent of the plant. Portable Bates packers are used, which may be moved any place on the floor and under any silo. Four stationary Bates 3-valve packers also are used.

The portable packers are moved on a specially designed steel-frame truck, the truck being moved from under the packers after they are in place. The legs of the portables are screws which bear on the floor and force a tight fit with the hopper of the packer and the feed gate of the silo. Used in conjunction with the portable packers is a portable sack conveyor which was built by the company. It is mounted on a rubber-tired trailer. Auto trucks and railroad cars are loaded directly from this conveyor.

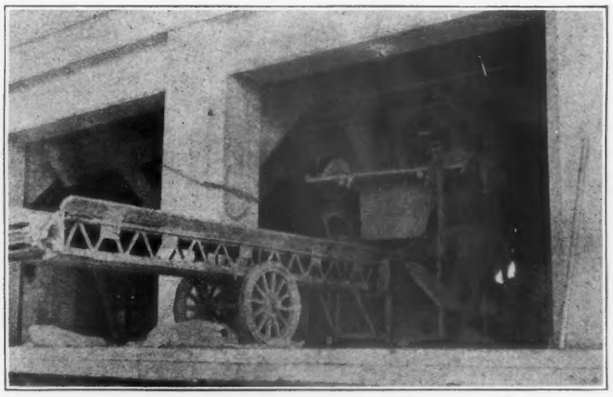
The silo-bins may also be emptied by another method using the stationary packers. By this method, the cement is fed from the silos by a revolving feeder, driven by a chain and sprocket from a shaft which runs along the gates of the feeders. The cement runs from the feeder, which was designed and built by Mr. Bartholomew, through a galvanized pipe to a screw conveyor built below floor-level. From the conveyor the cement is ele-



Dust collector for Fort Worth kilns, coolers, and (at left) inclined pan conveyor



Showing housing for feed and firing ends of new kiln in Fort Worth plant

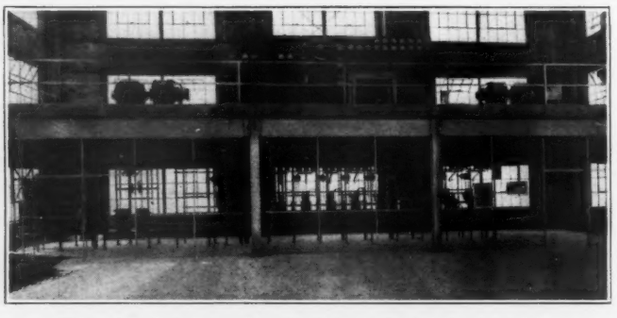


Portable packer and sack conveyor, Fort Worth plant

Compressors and pumps in Fort Worth power building

vated to the bins of the stationary packers. Sacked cement is trucked by hand to either motor trucks or railroad cars.

The sack cleaner is a revolving cylinder of wire netting 10 ft. in diameter fitted with beaters, and is located in a dust-tight room on the third floor.



Switchboard and controls, Fort Worth plant

Miscellaneous

The plant operates on purchased power. Transformers and the main control switch-board are located in a concrete building with structural steel framework and glass sides. Also housed in this building are the Sullivan compressors which supply air for agitating the slurry tanks.

A large and well-equipped machine shop is capable of all ordinary repairs even to the largest piece of machinery. Housed also in the machine-shop building is the well-stocked store room. Offices and laboratory are on the second floor. The offices are modern and the laboratory is well-designed.

A 700-hp. supersynchronous motor driving tube mills in Fort Worth plant

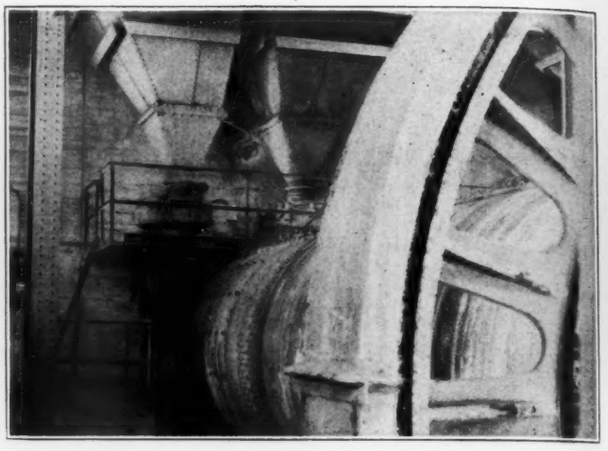


Table feeders and 8-ft. by 30-ft. mill in Fort Worth plant

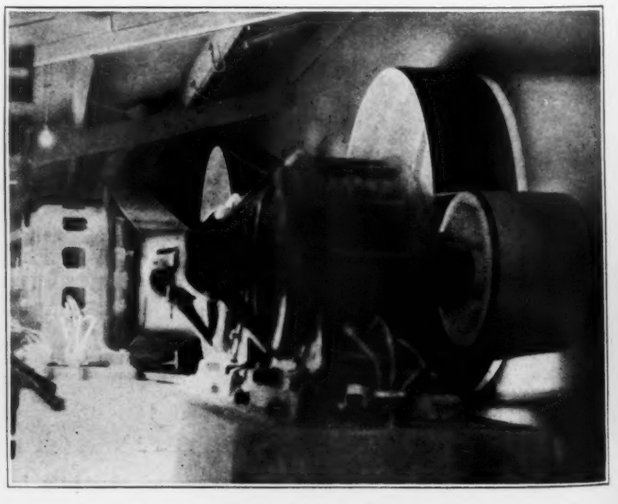
Water is supplied by a well which is blown with air, and the company has a small artificial lake dammed up for reserve if necessary. The comfort of the employees is taken care of by a well-appointed wash- and change-house. A large garage has also been built for the employees' cars.

While compactness and efficient design were achieved in this plant, architectural attractiveness was not overlooked. Concrete walks, roads and concrete covering for open spaces between buildings have been built about the plant, giving it a trim ship-shape appearance. A wide concrete road runs from the plant to the main highway.

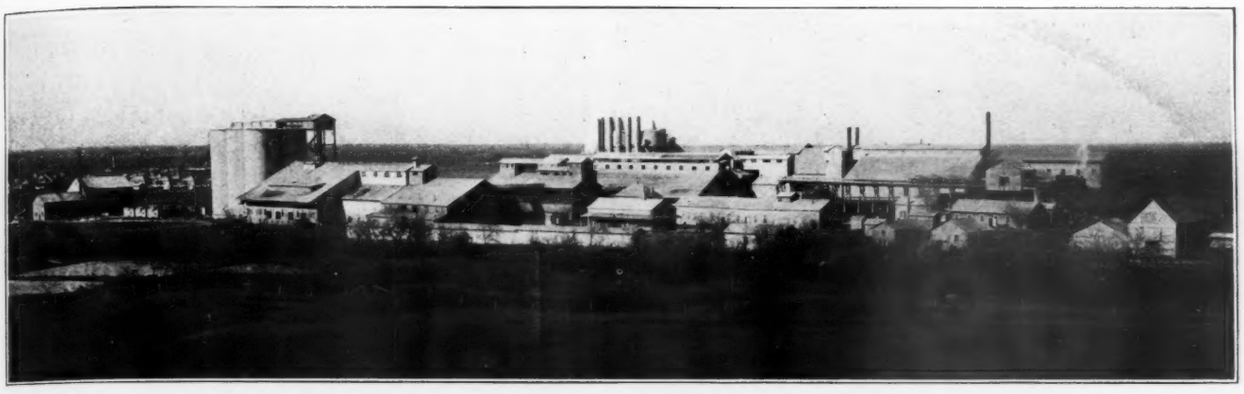
A. A. Chaney is superintendent and has been in charge of the plant since its construction in 1925. R. E. Dielman is chief plant chemist.

The Dallas Plant

The Dallas plant is located just outside of Dallas at Eagle Ford, Texas. It is the oldest plant of the



Tandem drive for finish tube mill in the Dallas plant



Panorama of Dallas plant of Trinity Portland Cement Company, from southeast

company and is one of the pioneer plants in Texas. The plant has been modernized, however, and improved practices incorporated, so that the results obtained compare favorably with many of the newer plants. Being a dry plant and an old plant, it is not quite as compact as most later-day mills.

The shale, until it is mixed with the rock, is handled in a plant separate from the rock plant. The drives for the machinery and conveyors are by belts from shaftings driven by electric motors. The drives give little trouble, however, although the difference by comparison with present-day direct or gear drives is quite noticeable.

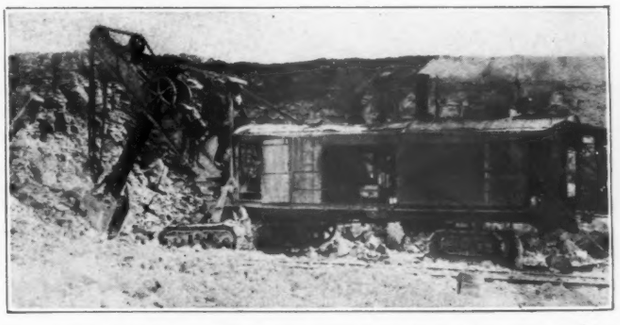
Quarrying

A face of considerable length, 40 ft. or 45 ft. in height, has been exposed in the rock quarry, the rock being the basal division of the Austin chalk. The stone has no overburden and the quarry is a comparatively short distance from the plant. Blast-hole drilling is done by a Sanderson-Cyclone electric drill. Blast holes are set at about 12-ft. centers and staggered. Immediately underlying the chalk is Eagle Ford shale, and the blast-holes are drilled to the shale. When the rock is blasted down, the shale is exposed and is easily dug by a No. 70 Marion steam shovel on crawler treads.

A No. 70 Marion railroad type shovel mounted on crawlers loads the rock and shale into 6-cu. yd. side-dump cars, which are handled by two 45-ton Vulcan standard-gauge locomotives.

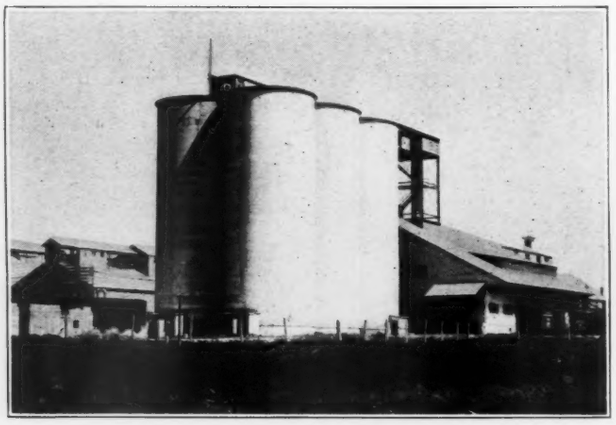
Rock Crushing

The track from the quarry extends through and beyond the crushing plant on a trestle, which affords storage for loaded cars. The cars are dumped into a steel-lined hopper and the material flows by gravity to a 36-in. by 60-in. Fairmount type Allis-Chalmers crusher driven through a belt drive by a General Electric motor. The crushed material is taken by a Link-Belt 42-in. pan conveyor to a No. 8 Williams mill for secondary crushing. The crushed rock from the Williams mill

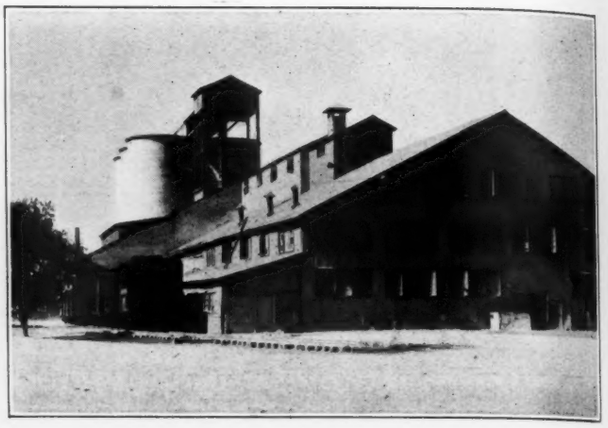


Steam shovel mounted on crawlers in Dallas quarry

The Dallas plant viewed from the west

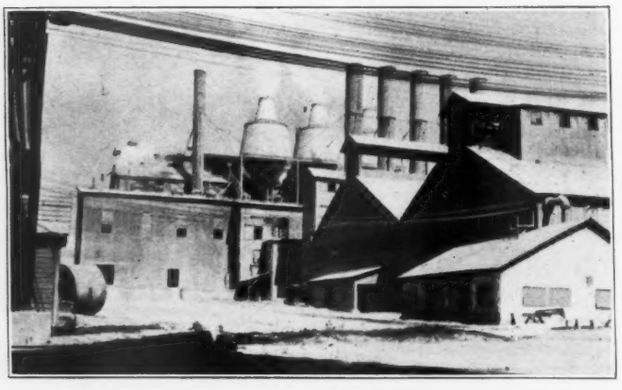


Old storage and packing house (left) and main silo storage, Dallas plant



Finish-grinding building, old packing house and storage, and cement silo storage, Dallas plant

empties on a 36-in. conveyor belt that carries it to the rock storage. The conveyor belt is inclined at an angle of about 20 deg. and is housed. Material is dumped from this belt onto an endless McCaslin



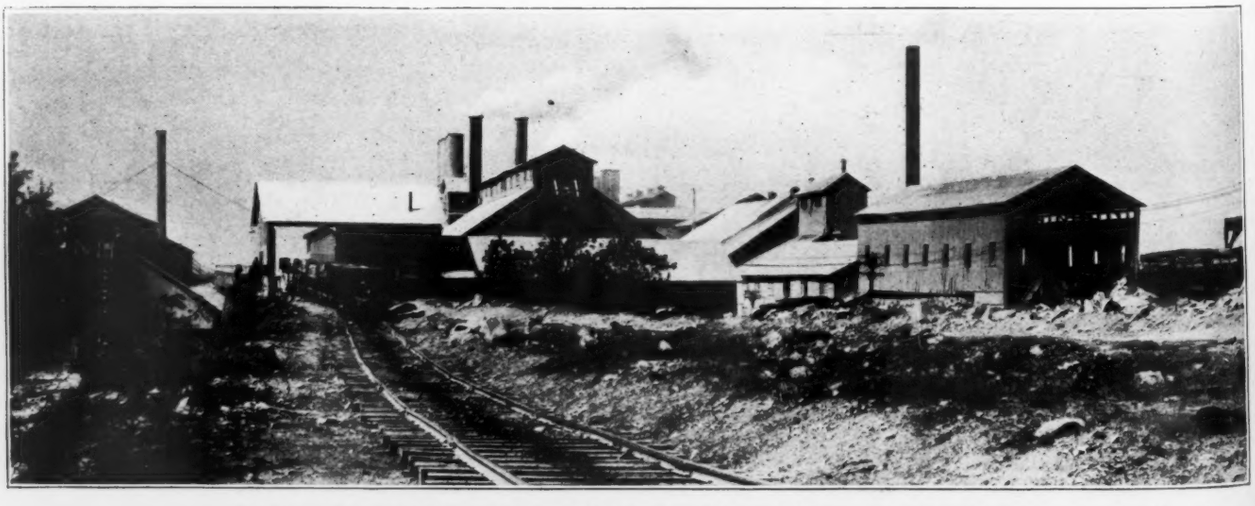
Power house at Dallas plant, showing flue-dust collectors, and (right) kiln house

conveyor which runs through the top of the rock storage building and returns through a tunnel below the structure. This conveyor can be set to dump at any part of the building by selective cam trips.

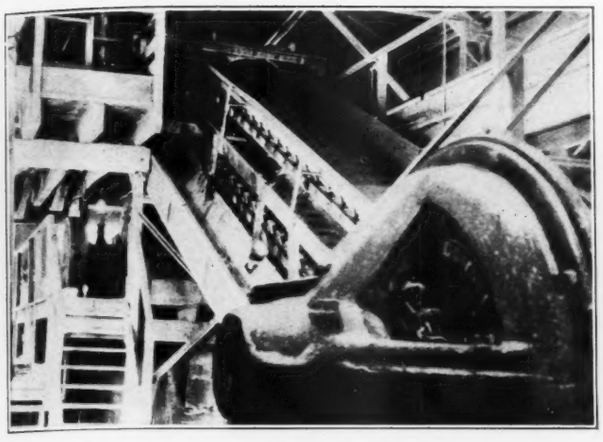
Material is drawn off from the bottom of the rock storage bins by the same McCaslin conveyor running in the tunnel and is carried either to the hopper of the dryers, or redistributed in the rock storage as desired. Crushed rock may be dumped direct from the crushers by the McCaslin conveyor into the hoppers of the dryers before being placed in storage, if production demands it.

Rock Drying

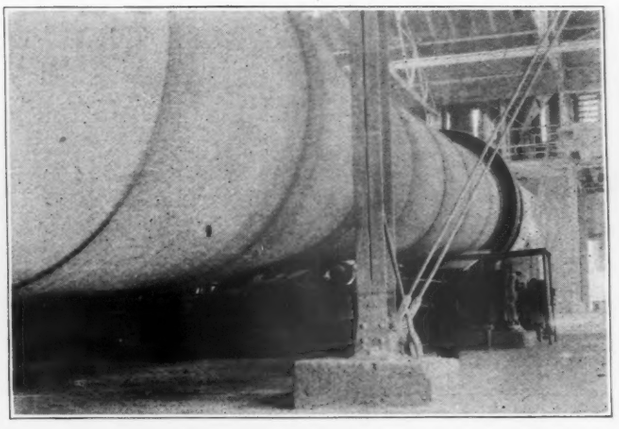
The dryer house is a steel-frame, corrugated-iron building and contains two Reeves Bros. gas-fired rotary dryers, 6 ft. in diameter by 70 ft. long. Tate-Jones and Company burners are used for efficient and economical combustion of the gas, and air is supplied by Clarage fans. The dryers are driven through a Reeve Bros. speed reducer, through belting and shafting, by a 40-hp. General Electric motor. From the dryers a Link-Belt screw conveyor carries the material to a bucket elevator which dumps into the ball-mill bins for preliminary grinding, material being carried to the different bins by a system of cross-screw conveyors. The elevators and screw conveyors are



Rock-crushing building (left) and shale-crushing building, in Dallas plant



Pan conveyor from primary crusher to secondary crushing mill in the Dallas plant



One of the kilns and its drive, in the Dallas plant

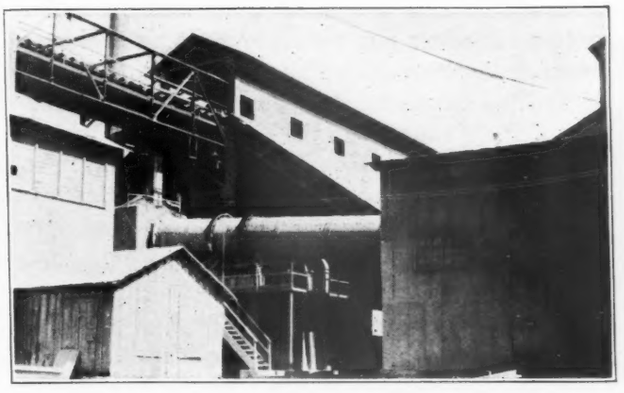
driven by a General Electric motor through a system of belts and shafting.

Preliminary Raw Grinding

Two-stage grinding is employed in this plant both in the raw and finish grind. Six Krupp ball mills do the preliminary raw grinding. The Krupp mills are housed in their own building. They are fed from the hoppers of the bins by an Allis-Chalmers rocker feeder. Each mill is driven by a General Electric motor through a belt drive.

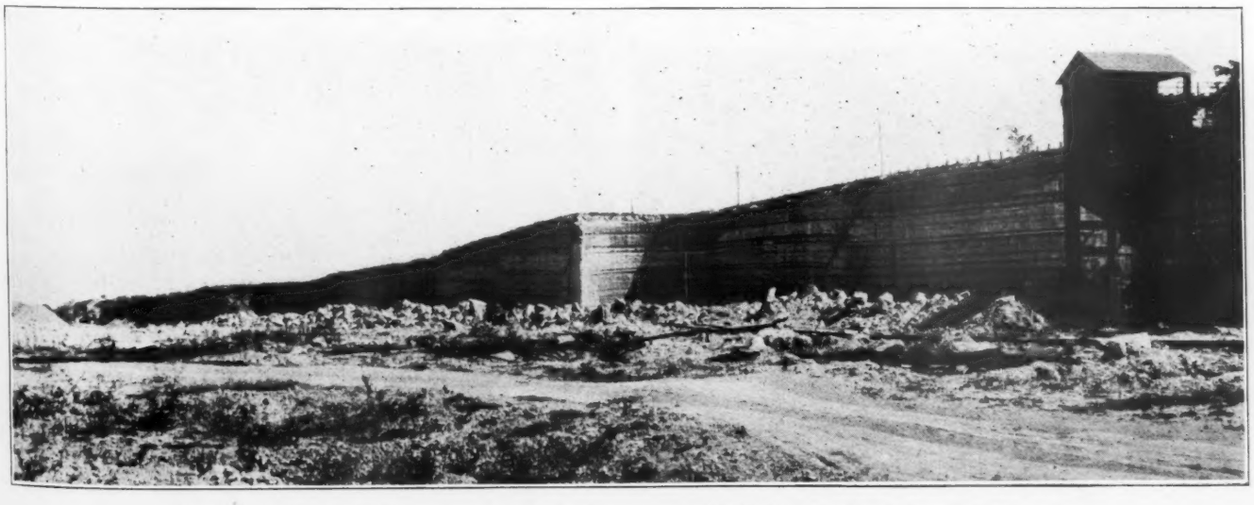
From the Krupp mills the ground rock is fed into screw conveyors where it is taken to a bucket elevator. This elevator lifts the material to another screw conveyor which dumps into analysis bins through cross-screw conveyors. All the conveyors and elevators are enclosed and are dustproof.

An interesting feature in the control of the mixture is found at this point. A sample of the ground rock is obtained, at the point where the elevator empties into the screw conveyor, by a sampling device that gathers a small amount of material all the while the bin is filling. The sampler is so regulated that when the analysis bin is full, the sampler is also full. This gives a close check on the amount of material in each bin. When each bin is filled, a bell rings in the chemical laboratory and the sample is gathered. There are four square analysis bins each equipped with hoppers. Their



Cooler at end of clinker storage, Dallas plant. Note conveyor (upper left)

total capacity is about 80 tons. They adjoin the raw-grinding tube-mill house. From the analysis bins the material is fed by a rotary feeder to a screw conveyor that carries the material to a



Part of the face of the quarry at the Dallas plant of Trinity Portland Cement Company

One of the tapered kilns in the Dallas plant

Rocker-arm feeder and one of the preliminary raw grinding mills in Dallas plant

bucket elevator. This elevator empties into the bin over the scales.

Shale Crushing and Drying

The shale crusher, dryer and storage are set parallel with like equipment in the rock plant. The shale from the quarry cars is dumped into a long hopper that runs alongside of the tracks and is fed onto a Link-Belt pan conveyor running in a tunnel beneath the hopper, which carries it to the crushing mills. From the conveyor, the shale is dumped into a chute that feeds the shale crusher, which is a remodeled United Iron Works dry-pan mill. From the shale mill the crushed shale is carried by a bucket elevator to the hopper of the dryer, from which it is fed into the dryer.

Shale Drying

Moisture is removed from the shale by a 6-ft. by 70-ft. Allis-Chalmers rotary dryer. The feed to the dryer is controlled by the speed of the rotation of the dryer, a power take-off from the dryer driving the feeder through a sprocket and chain. The dryer is fired with gas and uses burners of the company's own design and make. A Continental Gin Company No. 50 fan, driven through belting by a 10-hp. General Electric motor, furnishes air to the burners. The dryer is driven through a Reeves Bros. speed reducer by a belt which is run off a pulley on shafting driven by a 40-hp. General Electric motor. This motor also supplies power to some of the conveyor belts and elevators which take power off the shafting.

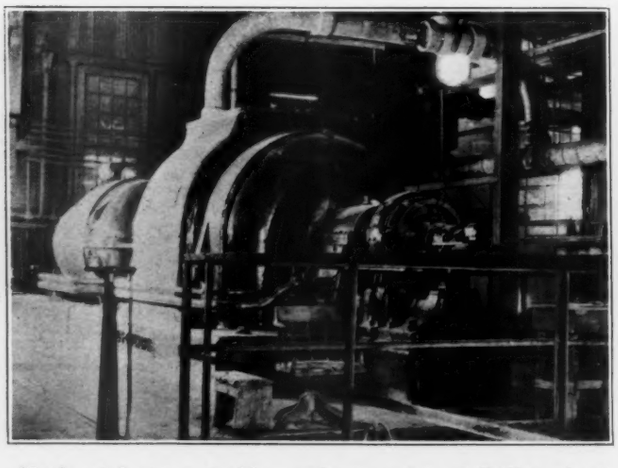
From the dryer, a bucket elevator raises the material to a screw conveyor which carries it to the shale storage building. This building is of steel framework with concrete foundation and sides, and a corrugated-iron roof. Underneath the shale storage is a tunnel in which screw conveyors draw off the shale, carrying it to a vertical bucket elevator that dumps the shale into a hopper at the scales.

Railroad cars of gypsum are unloaded into a hopper from which a Link-Belt bucket elevator carries the material to the gypsum storage bin located in the preliminary finish grinding mill.

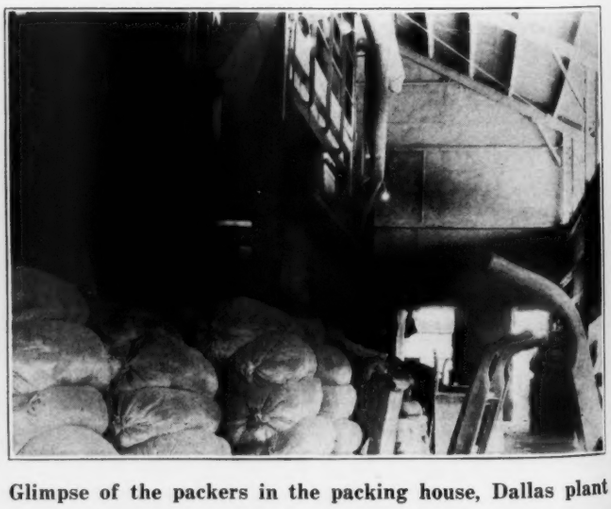
Raw Mixing

The scales might justly be termed the heart of the mill for here the dry mix of shale and preliminary ground lime rock is proportioned by weight.

Howe furnace stock-charging scales weigh both the shale and the rock in the desired proportions at the same instants. The scales dump the material into the hopper of the raw-material mixer.

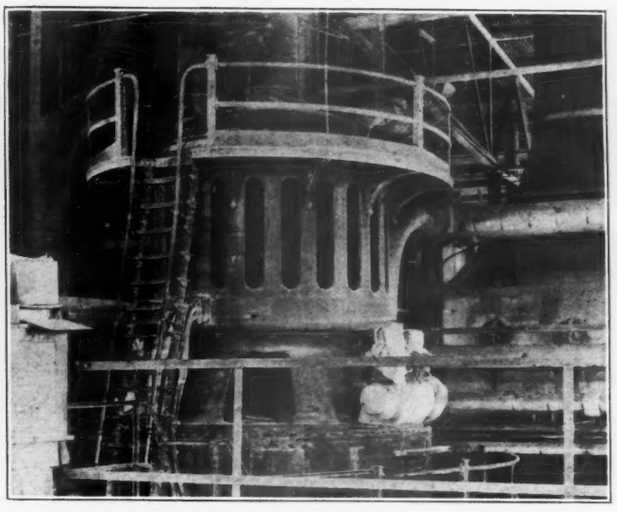


Horizontal steam turbine and generator at Dallas plant



Glimpse of the packers in the packing house, Dallas plant

Primary crusher in Dallas plant. Cars dump from track above the steel hopper



Upper portion of upright turbine and generator in the Dallas plant

The mixer is an Allis-Chalmers 5-ft. by 22-ft. rotary tube mill which was remodeled by the company as a mixer. From this mill, the mixed material is raised by a bucket elevator to screw conveyors which empty the material directly into the hoppers of the tube mills.

Final Raw Grinding

The raw-grinding tube-mill building is of concrete, steel frame, corrugated-iron construction. It is located parallel to and opposite the Krupp ball mills, where preliminary grinding of the limestone took place.

Eight 5-ft. by 22-ft. Allis-Chalmers rotary tube mills are used. Two 75-hp. General Electric motors, in tandem, drive the mills through a system of belts, pulleys, and shafting. The motors are housed in a shed adjoining the building.

A Bartholomew feeder, similar to the one in use at the Fort Worth plant, regulates the feed from the hoppers to the tube mills.

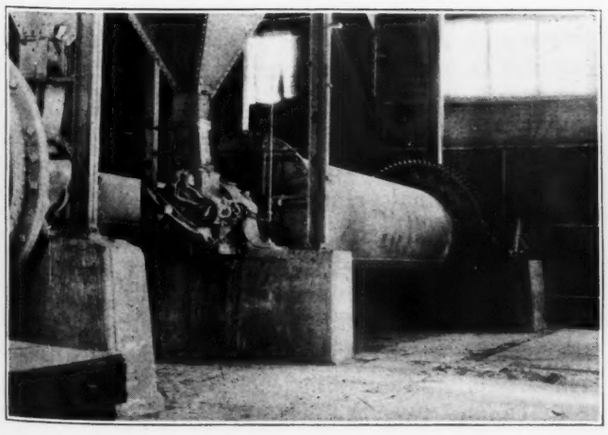
The raw mix is ground until 90 per cent will pass a 200-mesh sieve. From the tube mills the material is carried to the kiln-feed tanks by screw conveyors and cross-screw conveyors. The five kiln-feed tanks are similar to the analysis bins and have a capacity of approximately 80 tons. A test sample is taken for each kiln feed tank as the tank is filled, by a sampling device similar to that used as the material enters the analysis bins previously described.

Burning

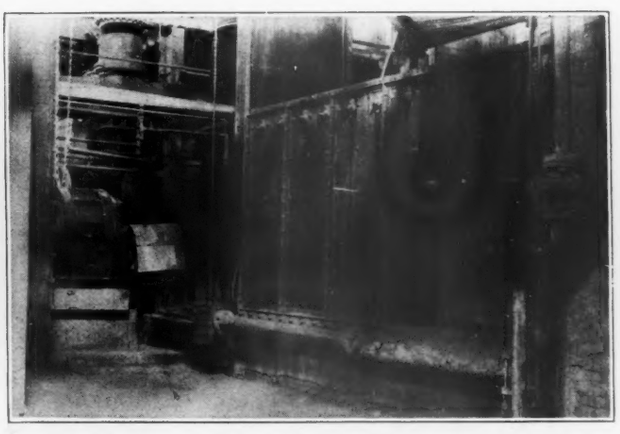
There are five rotary kilns, all completely housed. Two of the kilns are 10 ft. by 50 ft. at the firing end and taper to 8 ft. in diameter the remaining distance of 75 ft. These two kilns have Worthington firing ends, the remainder being of Reeves Bros. make. The other three are Reeves Bros. kilns, 8 ft. in diameter by 125 ft. in length.

Each kiln is driven, through a Reeves Bros. pinion-gear speed reduction unit, by a 50-hp. Westinghouse motor. The roll feeder also is driven from the Reeves speed reducer by a sprocket chain, the speed of rotation of the kilns thus governing the kiln-feed.

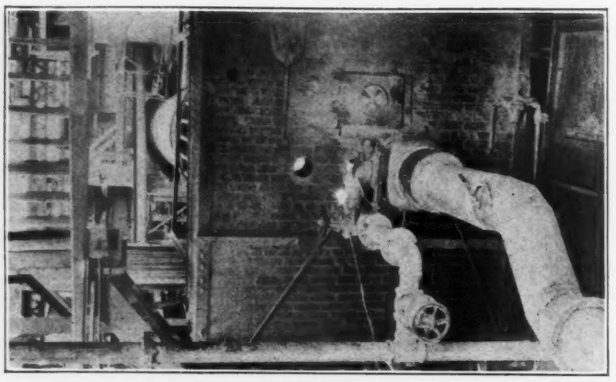
Gas is used as fuel for firing the kilns. The gas is fired under 1-lb. pressure, 10 cu. ft. of air being



End view of a finish tube mill in the Dallas plant with its rocker-arm feeder



Dallas plant power-house. Motor (left) drives boiler fan. Fuel economizers, and (right) edge of a boiler



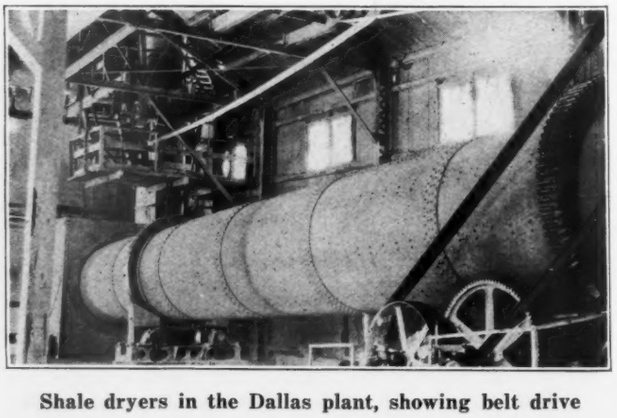
End view of one of the rock dryers, and its gas burner, in the Dallas plant

used to 1 cu. ft. of gas. The air is preheated off the clinker to a temperature of 350 deg. A Clarage fan supplies Tate-Jones and Company gas burners with the necessary air. These burners permit extremely thorough mixing of the gas and air. Air under pressure enters the back of the burner, flowing around the gas tubes, from which the gas issues through tiny openings. The tubes are placed spirally in the burner casing, permitting intimate contact of the gas with the air. The burners are compact and require little maintenance. The fans are driven directly by a belt from a General Electric motor.

A McCaslin conveyor runs beneath the firing ends of the kilns and the clinker falls into the conveyor which carries it to storage. A small amount of water is automatically fed into each section of this conveyor to prevent the conveyor from becoming overheated by the hot clinker.

The clinker storage building lies at a right angle to the kiln house. It is a long concrete structure with steel-frame supports, and a corrugated steel roof. From the clinker storage the material is fed to another McCaslin conveyor running in a tunnel and is carried to the cooler which is located between the kiln house and the clinker storage. The clinker, upon entering the cooler, is already semi-cooled by the water used when it is carried away from the kilns, and by being in storage a short time.

Cooling is finally completed in an Allis-Chalmers 6-ft. by 70-ft. rotary cooler. It is mounted parallel to the kilns and is elevated about 10 ft. The cooler is driven by a Westinghouse motor through a Reeves Bros. pinion-gear speed reducer. The clinker from the cooler is carried on a McCaslin conveyor to the Kent mill house for preliminary finish grinding.

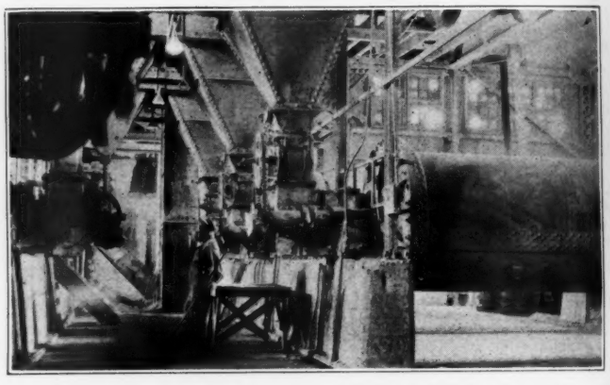


Shale dryers in the Dallas plant, showing belt drive

First Stage Finish Grinding

The Kent mills are housed in a long building of steel-frame construction with corrugated-iron siding and roof, located parallel to the clinker storage. There are six Kent mills in the building, arranged in two rows. Each is driven by a 50-hp. General Electric motor through a system of belting, shafts and pulleys, which also drives the feeders and separator screens of the mills.

Clinker too large to enter the Kent mills is first crushed by an Allis-Chalmers Gates crusher driven by a General Electric motor.



Bartholomew feeders to finish-grinding tube-mills in the Dallas plant

Each Kent mill is provided with a Lamb shaker-screen separator. This separator consists of screens, shaken by cams on a revolving shaft, and is the invention of E. W. Lamb, general foreman.

As the material is discharged from each mill, it is elevated and discharged into the respective separator where the coarse material is retained and returned to its Kent mill for further grinding. The fine material passing the screens is carried by screw conveyors to a set of Howe scales where gypsum is added before going to the final finish grinding mills.

From the Howe scales, the material is taken by screw conveyors to the bins of the finishing tube mills, where final grinding takes place.

Final Finish Grinding

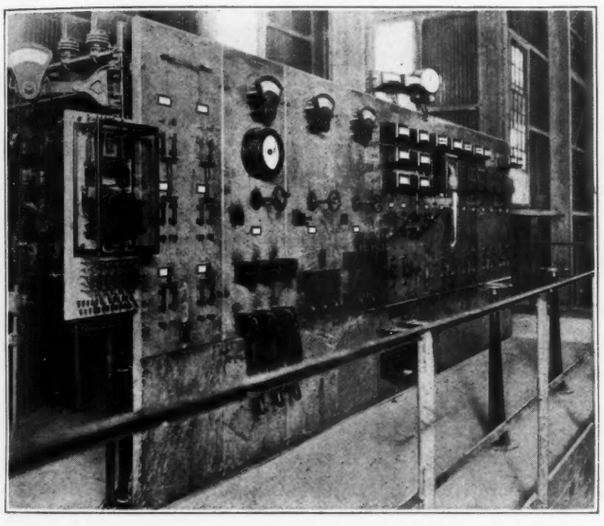
The building housing the tube mills also is of steel construction and as spacious as the structures housing the other grinding mills. There are six Allis-Chalmers tube mills, each 5 ft. by 22 ft. Each is driven by two 75-hp. General Electric motors and the tandem drive is similar to the raw grinding mill drives.

The mills are fed by Allis-Chalmers rocker-arm feeders. From the tube mills the finished cement is carried by enclosed screw conveyors to the cement storage.

Storage and Packing

The original cement storage consists of reinforced-concrete square bins supported by structural-steel framework. Cement is drawn from these bins by enclosed screw conveyors, through sliding gates, and is taken by elevators and cross-screw conveyors to the bins of the packers.

As the capacity of the plant increased, silo storage was added, and in addition to the original square bins, the plant now has six cement storage silos of own construction with two star, or interstice, bins. The silos are 32 ft. in diameter by 80 ft. in height. Cement is drawn from the silos by screw conveyors fed by Bartholomew feeders similar to those used to feed the raw grinding mills. Screw conveyors and the feeders are driven by General Electric motors.



Switchboard in power house at Dallas plant

From the cement storage, screw conveyors take the cement to an elevator, which dumps its load into cross-screw conveyors that distribute it to the bins of the packers. All screw conveyors and elevators are enclosed and are dust-proof.

The packing house contains six Bates packers. Two packers are located at one side of the packing house and load either into trucks or railroad cars. The other four packers are located on the opposite side of the building and also load into cars or to trucks.

Power Plant

One of the interesting features of the Dallas plant is its well-equipped power-house. The company generates its own electricity, utilizing waste heat from the kilns. Hot gases from the kiln exhaust are drawn through three 4-pass Edge Moor waste-heat boilers. After passing the Edge Moor boilers, the gases are drawn through Green fuel economizers which preheat the boiler water, after which they pass through dust collectors before being exhausted into the air.

Steam locomotive hauling loads from Dallas quarry

The gases from the kiln can be by-passed to the stacks of the kilns if desired. A gas boiler for emergency use is located in the power house.

A 5,000-kva. Allis-Chalmers steam turbine and generator supplies the plant normally with all the current used. A vertical Curtis-General Electric turbine-generator, with step bearing, is used if the Allis-Chalmers unit be shut down.

A 20-panel switch-board, controlling distribution through the plant, is located in the power house near the generator.

Housed also in the power house are two Sullivan air compressors and a 16-in. by 9-in. by 12-in. fire pump. Worthington centrifugal pumps are used throughout the plant for pumping water.

O. V. Bartholomew, general superintendent of the Trinity Portland Cement Company, makes his headquarters at the Dallas plant, as does J. W. Ganser, chief chemist, who has charge of the plant during any absence of Mr. Bartholomew. E. W. Lamb is general foreman; K. W. William, plant chemist; W. D. Stuart, chief electrician; R. O. Bartholomew, chief mechanical engineer; and J. D. Summers, chief steam engineer. The capacity of the plant is approximately 4,000 bbl. daily.

The Dallas plant has been a leader in accident-prevention work and, in 1928 and 1929, won Portland Cement Association Safety Trophies for operating each full year without a lost-time accident.

Cement silos (left), finish-grinding building, and clinker storage, at Dallas plant

Departmental Application of Overhead

BY J. J. BERLINER

THE items of overhead or indirect charges consist of three principal subdivisions:

1. Indirect material
2. Indirect labor
3. Indirect expense

These overhead items do not affect all departments alike. Some of them apply to all and others only to particular departments. This article covers their application in all cases.

Indirect Material

Indirect material usually includes the following:

1. Material which cannot be applied as a direct charge
2. Supplies
3. Scrap or waste material
4. Small perishable tools and dies

Material Which Cannot Be Applied as a Direct Charge

While certain classes of material sometimes used in manufacture should properly be applied as direct material, this is not always practicable because of the clerical labor involved in making the direct charge. In such cases, these items are preferably treated as a portion of the plant overhead under the caption of indirect material. If any of the items so treated are used in only one operating department of the plant, they are chargeable as part of the overhead of that department alone, and not as general overhead.

The treatment of direct material items in this manner has been subject to severe criticism by cost experts who apparently place theory above common-sense. It is not a question as to what is the correct method according to theory, but as to what is the most practical way. Manufacturing conditions cannot be changed nor should they be burdened with unnecessary red tape for the sake of "system."

Supplies

Factory supplies are usually required in every operating department of the plant. They consist of coal, waste, oil, brooms, rags used for polishing, and miscellaneous supplies peculiar to the operating departments. In large plants the supplies used during the year amount to a considerable sum. They are often requisitioned for use in each department from a general or supplies storeroom, which is the most satisfactory method. In small plants this plan is not always practicable; here supplies are usually purchased for each operating department, the charge to the department being made direct when the purchase is made. Care must be exercised that too much is not charged during any one particular month; as, for instance, when a stock of miscellaneous supplies is purchased for a six months' period. In such a case, a monthly charge must be made.

When it is impossible to charge supplies directly to departments, they must be apportioned more or less arbitrarily.

Scrap or Waste Material

Scrap or waste material consists of what is left after grading, cutting, trimming, sizing, polishing, or treating the direct material. Where the amount of scrap is negligible, its cost may be absorbed in the direct material cost and thus be included in the prime cost. Where the scrap material is an important item, a careful account should be kept of it in order to guard against the scrapping of too much material. Its dollars and cents should be determined and charged to a Scrap Material account. When the scrap cannot be utilized, its cost may be absorbed in the overhead of the particular department in which the waste occurs. Often a source of income is derived from the sale or other utilization of material which has been scrapped.

If the original cost value of scrap material has been absorbed as part of the direct material cost. any income derived from its sale should be credited to a Sundry Income account and be included as part of the additional income in the profit and loss statement of the business. However, if the cost value of the scrap material sold can be ascertained, this cost value should be deducted from the amount received, and the profit or loss upon this scrap material may then be ascertained separately. Where the amount received from the sale of scrap material is small as compared with the total cost of material scrapped, the income received on account of its sale may be credited to the overhead account, thus reducing the total overhead charge applicable to the operating departments.

Where scrap material is used in manufacturing a by-product or in making other articles for sale, it becomes a direct material charge. Its cost should then be ascertained so that a complete scrap stock record may be installed. When this procedure is followed, scrap will be requisitioned out of stock and its cost will become a direct material charge to be applied to the particular articles manufactured from the scrap.

Small Perishable Tools and Dies

Where small perishable tools are employed in manufacture, they may be included as an item of overhead, chargeable to the particular department in which they are used. If special tools or dies are purchased or manufactured for a particular job, order, or article, the cost of such tools or dies may be applied to the cost of the job, order or article for which they are procured. However, if these tools or dies are retained and have some

value after the completion of the particular job, order or article, an allowance should be made and a credit entry passed to the cost of the completed article. This credit allowance will usually be made on the basis of scrap value.

The value of any tools which are purchased or manufactured for continued use should not be included in the factory overhead unless they are perishable in character. Tools or special dies which can be used for a long period of time should be capitalized at a conservative value. Any deterioration in the value of these tools or dies should be considered when establishing rates applicable to capital assets.

Indirect or Non-Productive Labor

Indirect or non-productive labor includes the following:

1. (a) Lost time and idle time of productive workers (b) Time of helpers; sweepers; truckers
2. Supervisors and foremen
3. Superintendence
4. Inspector (when not considered as a direct labor charge)
5. Factory clerks
6. Employees on defective work
7. Employees in experimental work

In some factories all such labor is grouped under the one caption "Indirect Labor" and, therefore, whenever it is necessary to investigate an increase in indirect labor expenditures, a detailed analysis is necessary in order to ascertain the component parts of these expenditures. This condition can only be remedied when a basis for true comparison is obtainable, and such an important overhead item as indirect labor should be classified very completely according to its constituent parts. In small manufacturing plants, it may not be necessary to have an elaborate classification in indirect labor, and in these cases the foregoing classification may be somewhat abridged.

Where bonuses form part of the wage payment for either productive or non-productive labor, it is impracticable to change these payments to the accounts to which the original wages were charged. Where the bonuses are based directly upon increased production, they should be charged as part of the regular wages. If the bonuses are merely intended as an incentive to regular attendance or increased production, the amounts so paid should be charged as factory overhead to the departments in which the employees are engaged. If they cannot be so apportioned, they should be charged to a special amount and distributed over the various departments affected, upon some arbitrary basis.

Wherever bonuses are in the nature of gifts and are exceptional, they should not be treated as part of the factory overhead, but should be considered either as part of the administrative expenses of the business or as a distribution of profits.

Lost and Idle Time of Productive Workers

The productive employees of manufacturing plants often lose considerable time while awaiting assignments to definite pieces of work, while repairs are being made in the factory or because of unavoidable interruptions to the routine of production. The idle or non-productive time which is the result of these delays should be charged to the department in which the employees are idle.

While it is true that as much of the time of employees as possible should be applied to some definite job order, if actual costs are to be ascertained, this does not mean that idle time, lost because of non-assignment of the laborer or because of a temporary shut-down of the factory or a department of the factory, should be applied and absorbed as a direct element of cost in order to charge all time to some particular article. It is far more important to know the amount of this idle time than to have all productive time treated as a direct element of cost. The wastage of time can only be avoided if the time so lost is properly recorded. Labor reports should always provide for recording the idle time which cannot be charged to orders.

Under some manufacturing conditions, factory employees are often paid an additional amount of wages for overtime or for special work. In some cases, this extra wage allowance may be properly chargeable as a direct labor cost, but in other cases this excess of wages must be absorbed in the factory overhead. If overtime work is a common occurrence in a large plant and it is impossible to treat it as a direct labor cost, the additional wages are properly included as a non-productive labor item.

Time of Helpers, Sweepers, Truckers

Where there is a general inspection department which cannot be treated either as forming part of the direct labor cost or as a departmental overhead charge, the cost of its upkeep must be charged as equitable as possible to those departments the work of which he has to be inspected.

Factory Clerks' Salaries

Factory clerks' salaries include those of clerks who are engaged in the operating department, cost department clerks, storeroom clerks, pay-roll clerks, and miscellaneous clerks employed in various non-productive capacities. Their salaries should be charged to the respective departments with which they are connected. The salaries of those who work in the productive departments should be charged directly thereto. The time of factory clerks who are not wholly occupied in one operating department should be reported so as to permit their salaries to be distributed as seems to fit the needs of the case.

In considering whether a clerk's time is properly chargeable as part of the factory overhead, the ac-

tual facts in the matter must be reviewed. If the work done by the clerk is of an administrative character and has no connections, either directly or indirectly, with the producing of the goods, the time should be applied as part of the administrative expense. If a clerk is connected with the factory, and assists, either directly or indirectly, in the actual production, his time should be absorbed in the factory overhead.

Employees in Defective Work

The treatment of defective work, as a whole, depends upon the nature of the product manufactured and upon the amount and kind of defective work. Under some manufacturing conditions, many slight defects in the product are corrected by two or three men who devote all their time to this kind of work. In the language of the factory, they are called "doctors," in the sense that they remedy defects in the product.

Under conditions where standard products are manufactured, the time of these employees cannot be applied directly and it must be absorbed in the overhead. If the cost of correcting the defects is a general operating expense, it must be arbitrarily distributed over the operating departments.

When the correction of such defective work necessitates a considerable amount of extra labor and involves an additional routine of the product throughout the factory departments, the defective work should be recorded upon a separate factory order and the cost of correcting these defects should be applied separately in the same way that the costs are applied to any other spoiled order.

Employees on Experimental Work

Just as there are employees who devote all their time in defective work, so there are employees who devote all their time to experimental work with a view to improving the product, process or equipment. The salaries of such employees, whose time cannot be treated as productive and applied to any definite job, order or article, must be treated as indirect labor and absorbed in the factory overhead.

The time of these experimental workers is sometimes confined to a certain definite operating department, affecting only the articles there manufactured. If, however, this is not the case, and the time charge cannot be specifically applied, it must be distributed as overhead.

If the experimental work is costly in character and embodies the improvement of some one particular process, article or machine, a factory order should be issued for such work, and all applicable costs for material, labor and overhead should be charged to that particular order. This will give the total cost of the experimental work on that order. After ascertaining this, it can then either be capitalized or be charged to the operating department or product manufactured by being absorbed in the overhead for a definite period of time.

Indirect Expenses

The items of indirect expenses which compose the factory overhead may be classified as follows:

1. Rent
2. Insurance—fire and liability
3. Taxes
4. Interest
5. Power
6. Light
7. Heat
8. Freight and cartage inward; when not considered as a part of direct material charge
9. Over; short; and damage
10. Miscellaneous factory expenses
11. Depreciation
12. Maintenance; repairs and renewals

Items numbered 1 to 10 will be separately considered in this article. The item of rent is more or less fixed as to amount. This item is applicable to all departments of the business, including the selling and administrative as well as the various factory departments. The most practical method for the distribution of the rent charge is that which is based upon the proportion of floor space occupied. Consideration must always be given to the more desirable locations of the different departments. In other words, the same rate per square foot should not be used throughout the entire plant for every floor. On the contrary, a sliding scale should be established, so that the various locations throughout the plant will bear rates per square foot depending upon their desirability.

When the rent item is fixed and the space assigned to each particular department is also fixed, a schedule of the rent charges may then be established, and this fixed schedule may be used until changes in the amount of rent, or changes in departmental space, require a new distribution of this charge.

When the building is owned, items in lieu of rent, such as interest on mortgage and taxes on real estate, may be distributed over the various departments of the plant upon the basis of the floor space occupied by each.

Insurance—Fire and Liability

The fire insurance charge includes the amount paid for insurance upon buildings, equipment and merchandise stock. When blanket policies covering insurance on all of these items are issued, the entire amount of insurance paid is to be absorbed in the overhead, and it is often difficult to establish a basis for the charge to the various depart-

Most plants have certain employees who devote all their time to work of a non-productive character, such as helpers, sweepers and truckers. The time of such employees can only be applied in an indirect manner, and therefore must be considered as part of the factory overhead. As far as possible, the time of these employees should be charged to the department in which they are ordinarily en-

gaged. If they are transferred from one department to another, it may be necessary for them to keep separate and distinct records for each, so that their time will be charged correctly. If it is impossible, in smaller plants, to charge the wages of these employees directly to operating departments, the total amount may have to be distributed as seems most equitable.

Supervisors and Foremen

The charge for supervisors or foremen in manufacturing plants is a more or less fixed item. This charge is very readily determined for each operating department when each is supervised by its own foreman or supervisor. Under some conditions, foremen and supervisors devote their time and attention to different departments. In such cases an arbitrary distribution of the charge may have to be made, unless it is possible to establish a time report for these employees so that their time may be equitably distributed to each department to which they devote their attention.

Superintendence

Superintendence does not include the items of supervision or foremanship, but is restricted to such items as the wages paid to the general superintendent, assistant superintendent and production manager. These items apply to the entire plant, and in most industries cannot be localized and charged to a particular operating department. Therefore, they should be absorbed in the general operating expenses and be distributed to the departments upon some arbitrary basis.

Inspection, When Not Considered as a Direct Labor Charge

An inspection department is often a necessity, in which case the inspection time may be treated either as a part of the direct labor cost or included among the factory overhead expenses. If a departmental inspector is employed, the charge could properly be applied to the department in which he is engaged. Frequently, inspectors travel from one department to another. It is often possible to keep complete time and work reports for the actual work done by these inspectors so that, using these reports as a basis, their time may be charged to particular departments.

ments of the plant. The total value of the machinery, equipment and material stock carried in a department, plus a value for the building in which the department is located, usually provides a satisfactory basis for the distribution of the insurance charge.

When separate insurance policies are issued for the stock, the buildings and equipment, the insurance charge may be apportioned more accurately. The insurance of the stock may be distributed by some arbitrary method to the departments upon the basis of the value of stock carried in each, that of the equipment on the valuation of the equipment installed in the departments, and the insurance on the buildings.

Liability insurance affecting factory employees should be included in the factory overhead and distributed according to the amount of wages chargeable to each department.

Taxes

Taxes are varied in character and include local, city, and town taxes, state taxes, and United States Government taxes. Income taxes and capital stock taxes are not charges against cost and should not be included in the factory overhead. They are deductions from the undivided profits and should be so treated upon the financial records.

Real estate taxes may be considered as payments in lieu of rent, and as such distributed to the departments affected upon the basis of the space occupied by each. Taxes upon the valuation of the machinery and equipment may be distributed according to the value of such machinery and equipment used in each department of the plant. If these items cannot be distributed upon the basis of floor space or value of equipment, they must be applied upon some arbitrary basis.

Interest

When interest on the value of plant, machinery and equipment is to be treated as part of the cost, it should be included in the overhead of the various departments, the distribution being made in proportion to the valuation of the equipment used in each.

Where it is desirable to include as a cost of the interest on the capital invested in fixed assets, two special accounts should be opened in the ledger: (1) Interest Reserve account, and (2) Interest Income account. The interest, calculated for a current month, is charged as a cost in the same manner as any other cost item, while the total interest so charged is credited to Interest Reserve account. This account, of course, should not include or contain any interest charges which are actually paid for borrowed capital.

At the end of the current month, the amount of interest charged as a cost on the product actually shipped during the current month should be ascertained and charged to Interest Reserve account; the offsetting credit being to Interest Income account. Any interest items affecting manufacturing costs which have been actually paid or received would also be charged, or credited, to Interest Income account. The balance of Interest Income account would then be credited to profit and loss, while the balance of Interest Reserve account represents the interest on goods in process and finished stock. When the monthly financial statements are prepared, the Interest Reserve account

is deducted from the inventory of goods in process and finished stock is shown in the balance sheet. In this way, interest is not included as part of an asset in the financial statements. At the same time, the principle of charging interest as a cost for the purpose of fixing a fair selling price is adhered to.

Power, Light and Heat

When a factory operates a separate power plant the costs of this department should be compiled and ascertained separately. The total costs of the power, light and heat furnished to departments are distributed upon the basis of the space occupied and according to the meter readings and horsepower hours of the various machines. When it is difficult to separate the charges for light, heat and power, the items may have to be combined. When light and power are purchased, readings and the horsepower of the various machines operated again furnish the necessary data for the distribution of these charges. In this case, the heat is usually generated within the plant and its cost can be ascertained separately. The above items should be apportioned arbitrarily only when the more accurate information furnished by horsepower measurement of meter readings cannot be obtained.

Freight and Cartage Inward

It is often feasible to treat the item of freight and cartage inward as an element of direct cost, by adding it to the material price, and in that manner treating it as a part of material cost. However, under some manufacturing conditions, this is not practicable. The item must then be treated as overhead and applied to the various departments according to the value of the materials and supplies purchased. Freight and cartage inward on machinery and equipment should in all cases form a part of the cost of such machinery and equipment.

An objection is often raised to the addition of freight and cartage inward to the material cost, as this necessitates changing the unit price of the material purchased. The price is then apt to be a fractional amount. Before the addition, the unit price may have been an even amount of dollars and cents, thereby simplifying the figuring of material costs. After the addition, much more labor is involved in cost computation.

Even if it is possible to add freight and cartage inward to the cost of direct material, it is not always practicable to add it to the cost of supplies. Supplies are often received in bulk and consist of a number of articles. When freight and cartage are paid upon this bulk, it is difficult to distribute the charge with accuracy over the various items purchased. Therefore, in most cases, freight and cartage paid upon incoming supplies must be distributed over departments on some arbitrary basis.

Over, Short and Damage Account

In addition to the waste and scrap involved in processing material, as previously mentioned, a shrinkage or loss in its weight often occurs which cannot be accounted for. All shrinkage or losses which cannot be properly explained should first be charged to Over, Short and Damage account, and then to the department in which the loss or shrinkage occurs, if this is possible. Failing this, they may be apportioned in any equitable manner.

Over, Short and Damage account is often used for the purpose of making credits for adjustments which are necessary when material increases in quantity for some unknown reason, although care should be exercised to see that these increases do not offset losses. These should be properly investigated with a view to their remedy. In other words, a credit entry should not be passed for the express purpose of reducing the debit side of the Over, Short and Damage account.

Miscellaneous Factory Expenses

Some items of expenses, such as system work, analysis and investigations and special expenditures which cannot be classified under any of the headings previously mentioned, are often listed as Sundries in an analysis of factory indirect charges and charged to a Sundries or Miscellaneous account. This account should not be used as a dumping ground for all unclassified items. In practice, Sundries account is often found to contain important overhead, the identity of which is hidden in a number of miscellaneous charges. The Sundries account should permit of a ready analysis so that the component parts may at all times be investigated, any item wrongly included therein charged to its proper account.

Whenever it is possible, miscellaneous factory expenses should be charged to the departments in which they originate, a proper departmental overhead rate is to be established. Where it is impracticable to charge these items directly to departments, they must be distributed on some arbitrary basis.

Asphalts and Allied Substances

The third edition of an 890-page volume bearing the above title has been issued by D. Van Nostrand Company, Inc., 250 Fourth Ave., New York, N. Y. The book has proved a valuable reference book for more than a decade, its author, Herbert Abraham, president of The Ruberoid Company, having covered his subject exhaustively. To keep pace with developments in the occurrence, modes of production, and the uses of asphaltic substances in the arts, the author has rewritten the book completely. The discussions are worldwide in their scope. Reference to particular topics is available easily through its classified index as well as by its table of contents. The price of the book is $10 net.

A. and K. Builders' Supply Co. of Jamestown, N. Y., Operates Recently Rebuilt Plant

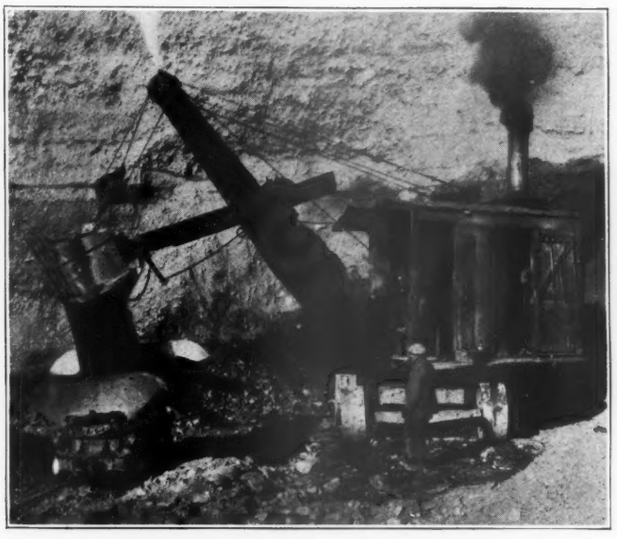
Unusual But Thorough Method of Washing Produces Cleanest Possible Material

JAMESTOWN, N. Y., a city of about 45,000 people located in the summer resort section of western New York state, has an unusually convenient source of supply for building material. The sand and gravel plant of the A. and K. Builders' Supply Company is located on a 16-acre property about 1¼ miles west of the heart of the city. Most of the output is used in the city but some is used for road-work in the vicinity.

The company was formed in 1922 to sell bank gravel. A sand and gravel plant was built in 1925 and was operated with only a few changes until about a year ago when it was almost entirely rebuilt. This plant was designed by its owners and has a capacity of about 750 cu. yd. per day. All shipping is done by truck. It is of wooden construction with concrete foundations. The system of washing the material is unusual and very thorough, producing material which will pass the most stringent specifications.

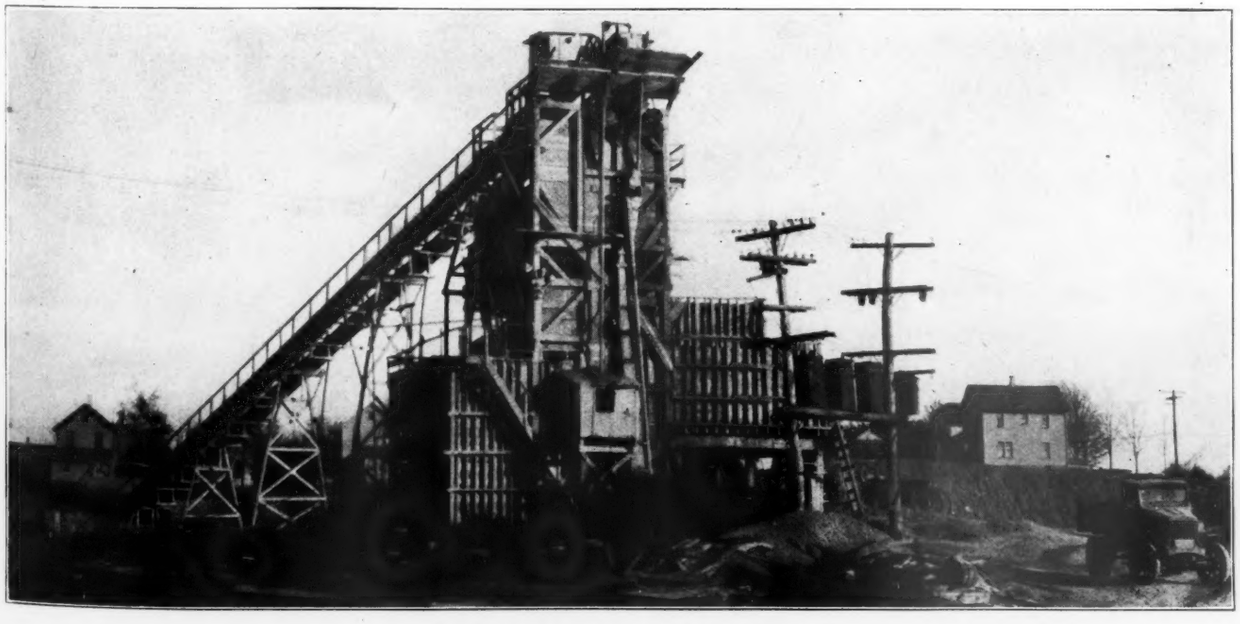
The deposit is well-graded gravel and sand and is about 125 ft. deep. The overburden, averaging about 5 ft. in thickness, is removed by a ¾-cu. yd. Erie crawler steam shovel. Due to the hilly country and to the proximity of the plant to a good and rapidly-growing residence section, most of this is sold for fill.

The pit is at present about 90 ft. deep. Gravel is loaded from the almost vertical face by an Erie full-revolving, flat-wheel type, ½-cu. yd. steam shovel into a Koppel 3-cu. yd. steel rocker-dump car. This is hauled up the incline to the primary crusher by an O. K. Clutch and Machinery Company 2-drum hoist which is gear-driven by a 4-cylinder 65-hp. Climax gasoline engine. While waiting for the car to return the shovel breaks down gravel from the face to facilitate loading.

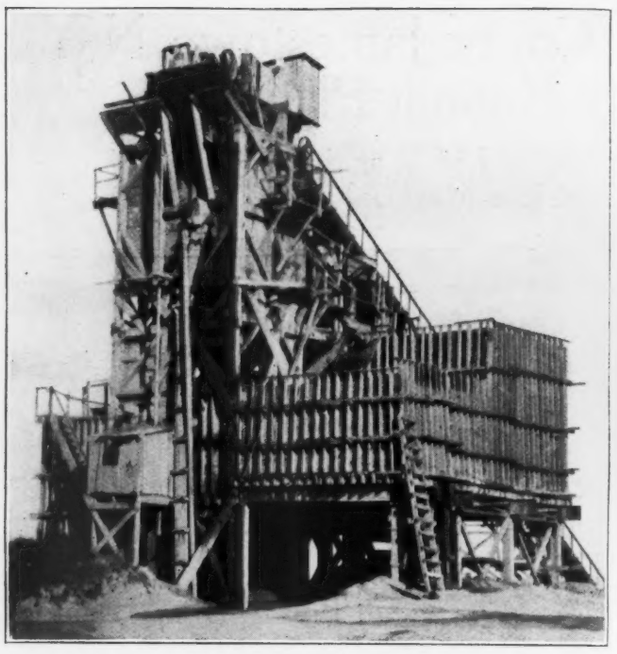


Steam shovel loading car in pit

The car is dumped into a steel-lined hopper. A Webster plate feeder discharges the material into the 48-in. by 12-ft. Webster revolving scalping screen which has 2½-in. perforations. The over-



Plant from south, pit in background



Plant from east

size drops to the Austin No. 5 gyratory primary crusher which discharges to the Webster chain bucket elevator. This and the material passing through the scalping screen drop to the 30-in. 99-ft.-center Webster inclined belt conveyor to the secondary crushing plant. The primary crusher is belt-driven by a 50-hp. Westinghouse motor. The elevator and feeder are chain-driven from the crusher shaft. The conveyor is belt- and chain-driven by a 20 hp. Westinghouse motor.

The conveyor discharges into another 48-in. by

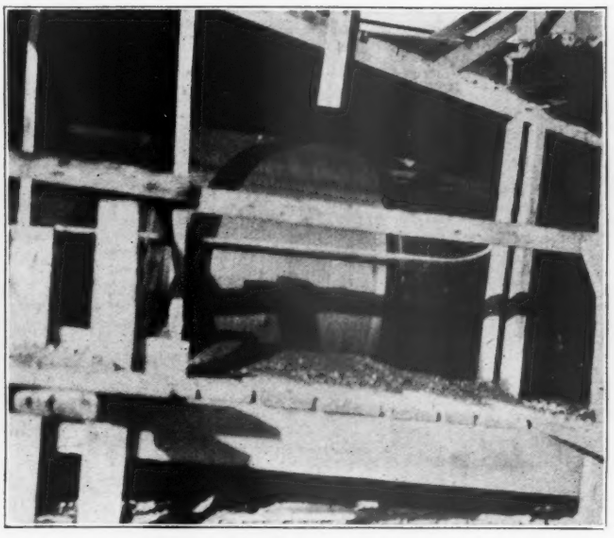
Conveyor from primary to secondary crushing and screening plant. Hoist at left

12-ft. Webster revolving screen with 2½-in. perforations. The oversize goes to a Climax 10-in. by 20-in. jaw crusher, the product of which, with the material passing through the screen, goes to a second inclined belt conveyor to the screening plant. The secondary crusher is belt-driven by a 50-hp. General Electric motor. The secondary screen is chain- and gear-driven from the crusher drive shaft.

The 20-in. 297-ft.-center conveyor discharges into a Webster 48-in. by 9-ft. revolving screen. This has a 5-ft. scrubber section, the remaining 4 ft. having ¾-in. perforations. A jet of water in the chute gives the material a preliminary washing. The material under ¾-in. goes through a chute to

Car dumping into primary scalping screen

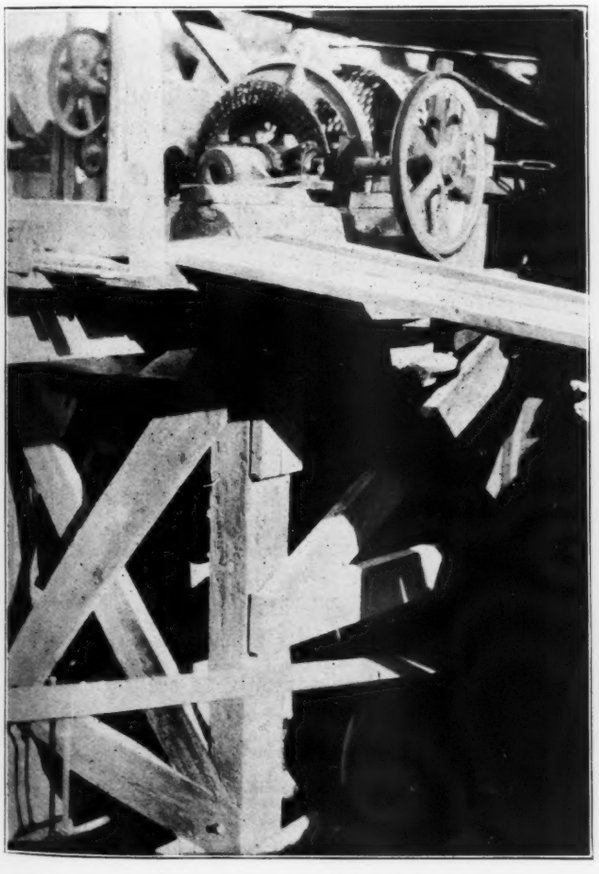
One of the two 7-ft. sand cones which give the second washing



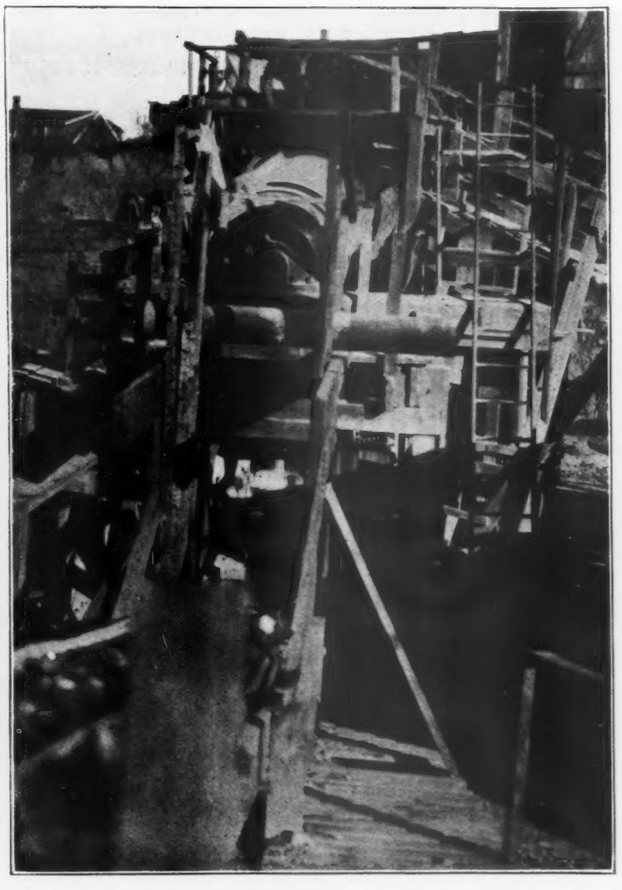
The jacketed main sizing screen

two 7-ft. Link-Belt sand cones where the dirt and water are run off. The cones discharge through a chute into the Webster 48-in. by 20-ft. revolving sizing screen. The material over ¾-in. from the scrubber screen discharges through a chute into the same screen. This screen has a 5-ft. scrubber section and a 5-ft. sand jacket. A jet of water gives the material a further washing. Three sizes of gravel and one of sand are produced, the gravel going direct to the bins through chutes. The sand goes to a 21-ft. Webster sand drag box where the sand is given its fifth and final washing before it goes to the bins. The scrubber screen and the sizing screen are both driven through belt and gear by 15-hp. Westinghouse motors. The sand drag box is driven through Morse silent chain drive and gear by a Fuerst-Friedman Company 10-hp. motor.

The seven wooden bins are steel-braced and have



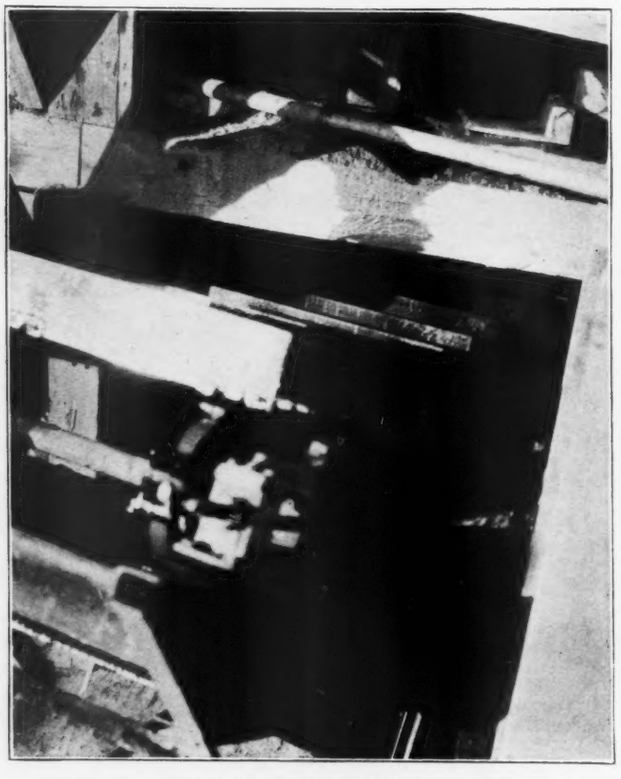
Primary scalping screen with gyratory primary crusher below



The secondary screen and jaw crusher, conveyor to plant in foreground

Truck loading under bins

a total capacity of 640 cu. yd. The three larger bins under the main plant are used for gravel and sand and discharge through bottom gates into trucks. Batch hoppers on two of these gates allow batching of materials for concrete work. The four smaller bins alongside the plant discharge through side chutes.



Drag box which gives the sand its final washing

Water used for washing this material is pumped from Chautauqua Lake, about one mile away, by a 4-in. centrifugal pump through a 6-in. line. This operates against a 247-ft. head. The clean water is used to give the material its second washing in the sizing screen. This water then goes to a 500-gal. steel tank under the cones which is used for a sump. A Goulds 3-in. centrifugal pump direct-driven by a Lincoln 15-hp. motor pumps the overflow from this tank to the scrubber screen for the initial washing. This method insures the cleanest possible product.

The company office is maintained on the property. Officers are: Alvin Anderson, president and general manager; Sherman Keyes, vice-president; Russel F. Ellingworth, secretary and treasurer. Allen Bloomquist is plant superintendent. The company also operates a small sand plant near Jamestown. This was built last year and has a capacity of 175 cu. yd. per day.

National Slate Association To Meet in New York

The slate industry will hold its annual conferences under the auspices of the National Slate Association at the Hotel Commodore, New York City, on January 20, 21 and 22.

Several hundred delegates will attend from all sections of the country, including quarry and mill executives, slate-products distributors, and slate-roofing and setting contractors.

The theme of the general meetings will be "Improving Trade Relations." Trade practices in the industry and relations between the various groups will be considered with a view to coordinating the efforts of all. The annual dinner and theater party, with the usual splendid entertainment, will occur on Tuesday, while on Wednesday, a joint meeting will be held of the executives, the slate trade and the members of the hosts club, with Committee D-16 on slate of the American Society for Testing Material, William B. Plank of Lafayette College presiding.

From a P and Q Advertiser

"The writer wishes not only to compliment you upon the service that you give your advertisers but to add thereto the statement that in his opinion PIT AND QUARRY is one of the most active mediums for advertising and from which more results are obtained with which we have ever come in contact, and the co-operation you give your advertisers certainly is very much appreciated by us."

Recent Researches on Cement, Cement Mortar and Concrete*

By DR. OTTO GRAF, Stuttgart, Germany

[*Editorial Note—The following article by a well-known German authority on cement and concrete discusses the significance of a number of investigations leading up to the present state of knowledge concerning these materials, and is based on the fact that the utility of tests on cement and aggregates must be judged largely from the standpoint of enabling the users of these materials to determine in advance the strength and quality of their concrete and to purchase their materials accordingly. It is of considerable interest, both as a summary of a number of important German investigations from many different sources, and as a review of conditions having much in common with those in this country.*]

IN AN article published several years ago in the *V. D. I. Zeitschrift* (Vol. 68, 1924, p. 953), I made a report on the development of the quality of cements, in which it was emphasized that cements showed a progressive improvement both in time of hardening and in compressive strength. The extension of our knowledge of the properties of cements and of concrete is making possible a widespread employment of cement. In the purchase of this cement there must take place a testing according to the standards and a continued determination of the concrete strengths in actual construction. The conclusive indication is the concrete testing, established from time to time according to the needs of construction.

Cement Testing

Concerning the selection of cements by the standard tests the sole observation is that the development of the quality of cements is measured through this standard testing method. This method has remained essentially unchanged during five decades and no longer satisfactorily covers the present-day requirements.

The German standard specifications for uniform production and testing of portland cement, iron-portland cement and blast furnace cement require that slightly moist mortar of one part by weight of the cement and three parts by weight of a determined exactly specified sand, after a specific working and handling, shall yield compressive and tensile strengths that lie above certain minima. The amount of the attained strengths shows whether the cement corresponds to the minimum requirements in the sense of the specifications. This determination is not the most important one for the cement user. That the German portland, iron-portland, and blast furnace cements correspond to the standards, was in years past and is also today self-evident. The testing of cements is therefore occasioned not so much because doubts concerning the minimum strengths exist, but rather because there shall be ascertained:

1—Whether the strength of cement from a determined plant, by the standard tests, remains around a certain amount above the minima, varies within narrow limits, or shows considerable irregularities.

2—Which cements, other considerations being equal, yield the higher strengths in the concrete, and whether the superiority is regularly to be expected in relation to what is said under 1.

The usual application of the testing of cement assumes that the strength of the concrete and of the mortar that are produced in construction work, other circumstances being equal, varies directly with the specification strengths; that, for example, cement yielding a compressive strength of 600 kg. per sq. cm. in the specification tests, as contrasted with a cement yielding 300 kg. per sq. cm., yields also twice as great compressive strength in the concrete. This assumption has been found acceptable in the case of many cements, at least with the approximation that is generally to be expected. But there are also exceptions; that is, there are cements which yield less strength in the concrete than the strengths by the specification tests cause to be expected. As I have repeatedly had opportunity to observe such exceptions, I may be permitted to mention here the results from some of these tests. Cases which had hazardous consequences in practice seldom remained; further research often established less impressive variations from the average proportions.

Table 1 shows how the strengths of mortar of plastic consistency, with graded sands, do not at

TABLE 1.

Strengths of Mortars Prepared in Different Ways

Cement	28-day compressive strength in specification tests	Specimens with graded sand					
		Water-Cement Ratio			Compressive Strength kg/cm²		
		1:4 slightly moist	1:2 plastic	1:4 plastic	1:4* slightly moist	1:2** plastic	1:4** plastic
D	671	0.39	0.41	0.66	581	666	294
B	369	0.37	0.47	0.75	311	202	58
R	342	0.37	0.47	0.75	256	172	49

*1 day in moist air, 27 days in water from 15 to 20 deg. C.
**1 day under moist cloths, 6 days in water from 15 to 20 deg. C., 21 days dry in a space with 15 to 20 deg. C. air temperature.

*Translated from *V. D. I. Zeitschrift* (Berlin) 73:1401-4, Sept. 28, 1929.

all coincide with the strengths of the mortar made with a minimum of mixing water ("slightly moist," as in the specification tests). The ratios are:

For the strength in the standard tests	671:369:342 = 1:0.55:0.51
For plastic mortar with graded sand (1 : 2)	666:202:172 = 1:0.30:0.26
For plastic mortar with graded sand (1 : 4)	294: 58: 49 = 1:0.20:0.17

The difference became greater with increasing water-cement ratio. This result gives reason, in the case of construction with poured concrete, and especially in the case of concrete that is prepared with much water, not to forget that there are cements which under such conditions yield less strength than the standard tests cause to be expected. Table 2 contains further examples. Last year I encountered a particularly striking example. Out of the investigation that led to its explanation the following figures may be quoted:

TABLE 2.
Strengths of Mortars with Different Cements

Cement	Standard Tests of the Cements			Mortars of 1 part by weight of cement and 3 parts by weight of Rhine sand*		
	Water-cement ratio	Compressive strength kg/cm²		Water-cement ratio	Compressive strength kg/cm² (and specific weight g/cm³)	
		7 days	28 days		7 days	28 days
S	0.33	341	539	0.63	102 (2.14)	223 (2.04)
N	0.33	309	451	0.65	111 (2.15)	224 (2.03)
H	0.31	233	432	0.61	62 (2.16)	159 (2.04)
P	0.35	221	405	0.65	59 (2.16)	136 (2.02)

*Rhine sand grading as follows: 100% through 7-mm. screen, 84.3% through 3-mm , 72.9% through 1-mm., and 7.3% through 900 mesh per cm².

Cement	a	l	g	
Strengths in standard tests...	570	546	546	kg/cm²
Fluid mortar (1 :4, 0.88 water-cement ratio, 28-day strength)	186	154	46	kg/cm²

These investigations demonstrate that there is occasion in certain cases to undertake, in addition to the present standard tests based on slightly moist mortars, which in actual construction never or at least seldom occur, tests with plastic and fluid mortars with graded sands, which approximate actual conditions. (See Graf, *Tonindustrie-Zeitung* 51, 1927, p. 1564.)

In all this we should by no means fail to acknowledge the great progress which the German cement producers have to their credit, and which has been very gratifying since early times, both in regard to strength and also in regard to rapidity of hardening of portland cement. Engineers make good their wishes exactly in so far as the requirements of practice are most closely followed.

Among these wishes we may not forget that leading engineers have again and again pointed out that shrinkage of concrete—that is, its decrease in volume on drying out—still presents manifold difficulties. When we are successful in producing reliable cements which, besides high tensile strengths, yield a concrete of little shrinkage, this advance can be hailed as one of especial importance.

Grading of the Aggregate

Fuller and Thompson (*Proc. Am. Soc. C. E.*, 33, 1907, p. 222) concluded from their compression researches that gravel concrete yields the highest strengths when its composition conforms with the curves presented in Figs. 1 and 2. According to this, the particles up to 1/10 D—that is, up to one-tenth of the size of the largest pieces in the concrete—should constitute about three-tenths to four-tenths of the dry components of the concrete, including the cement. A parabola is chosen for the grading of the particles up to 1/10 D.

These findings, still important even today, can only seldom be directly applied in actual construction work, because of the varying coarse aggregate content chosen as suitable in various types of construction; in tamped concrete, coarser aggregate can be employed than in reinforced concrete; reinforced concrete with many reinforcing elements closely spaced requires concrete with more mortar

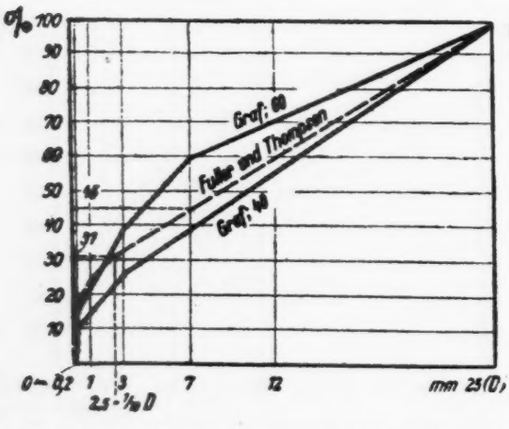


Fig. 1. Grading for concrete with river sand and coarse aggregate up to 25mm.; curves according to Fuller and Thompson, and Graf, for 40 and for 60 per cent mortar

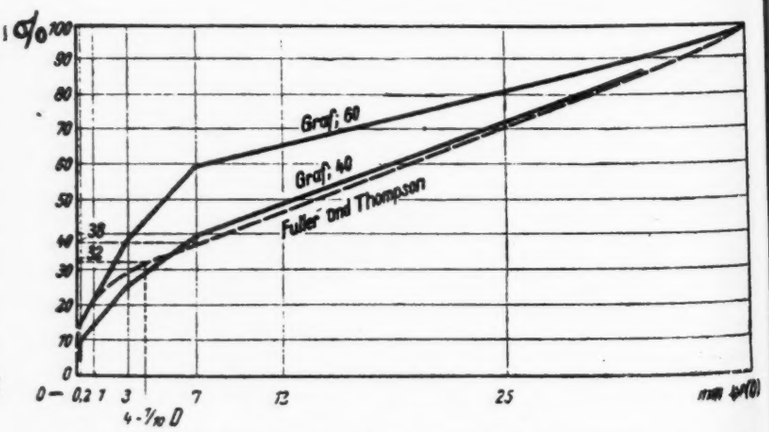


Fig. 2. Grading for concrete with river sand and coarse aggregate up to 40 mm.: curves according to Fuller and Thompson, and Graf for 40 and for 60 per cent mortar

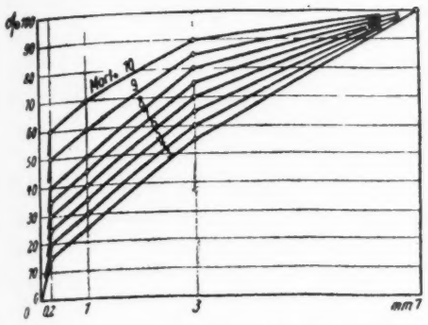


Fig. 3. Grading of the various mortars which were used preponderantly in the later investigations

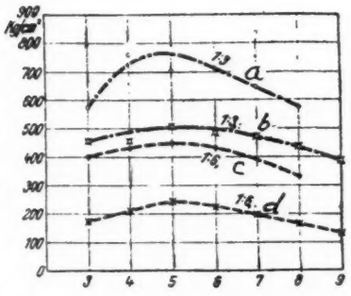


Fig. 4. Compressive strengths for mortars 3 to 9 at 12 months: (a) 1-3 slightly moist, (b) 1-3 plastic, (c) 1-6 slightly moist, (d) 1-6 plastic mix. Storage 14 days moist, 1½ months in the air, then under water

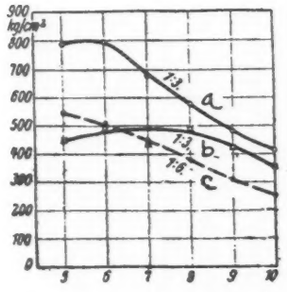


Fig. 5. Compressive strengths of mortars 5 to 10 with basalt crusher sand at age of 6 months—(a, b, c) as in Fig. 4. Storage 14 days under damp cloths, then in the air

than massive concrete structures with open-spaced reinforcing. Other considerations obviously are the nature of the natural deposits and costs of obtaining and handling.

This situation gave cause for investigating what in practice is suitable for coarse aggregates. Experience taught that the limit of the coarse aggregate was to be sought somewhere near the particles which pass through the 7-mm. (0.28-in.) round screen opening, approximately equivalent to the 5-mm. (0.20-in.) mesh sieve. When the basic mass is chosen of the particles up to 7 mm., with addition of varying amounts of the coarse pieces (gravel, crushed stone, etc., ranging up to 12, 25, 40 mm., etc., according to the case), all requirements—so far as I have been able to pursue the matter—could be fulfilled.

It was further to be investigated, what effect the amount of the coarse aggregate has under determined conditions. Out of such researches comes Table 3 (cf. Graf, *Armierter Beton* 7, 1914, pp. 197 ff.). Using a constant mortar, varying amounts of crushed stone or gravel were added to it. The compressive strength in these tests did not change considerably so long as the amount of the mortar was sufficient to surround the coarse particles. This was a finding of evident importance, not only as demonstrating the suitability of this method of proportioning concrete (separation of the sand through the 7-mm. round screen opening, and formation of varying concretes through variations in the amount of coarse aggregates retained on this screen), but especially because the strength of the mortar was thereby shown to be the essential determining factor. In this way the procedure of proportioning concrete according to its purpose was considerably simplified. The grading of the coarse parts was of secondary importance; the composition of the mortar (0 to 77 mm.) was the prime determining factor.

TABLE 3.
Effect of Amount of Course Aggregates

Tamped Concrete or portland cement, Rhine sand from 0 to 7 mm., and crushed limestone from 7 to 40 mm.			Plastic Concrete of portland cement, Rhine sand from 0 to 7 mm., and Rhine gravel from 7 to 25 mm.		
Parts by Volume	Compressive strength kg/cm²	Cement per m³ of concrete (grams)	Parts by Volume	Compressive strength kg/cm²	Cement per m³ of concrete (grams)
1 c.:2 s.	360	730	1 c.:2 s.	311	650
1 c.:2 s.:1 c. s.	379	570	1 c.:2 s.:2 g.	313	390
1 c.:2 s.:2 c. s.	399	470	1 c.:2 s.:3.5 g.	294	310
1 c.:2 s :4 c. s.	405	340	1 c.:2 s.:5 g.	270	250

Grading of the Particles in Concrete Mortar

Proceeding from these findings, there has been sought, through numerous experiments with different cements and different sands (river sands, glacial sands, crusher sands) the composition of the mortar which, other conditions being equal, yields the highest strength. Through these it was shown that the granular composition of the mortars and of the sands which, other factors being equal (cement content, consistency, etc.), yields the highest strength is different for sands of different granular shape, but that the grading of the mix of cement and sand of uniform granular shape can be chosen without variation. For river sands, it was found that the compressive strength of the mortar which follows curve 5 in Fig. 3 lies near the highest attainable. With morainal sand the line of the grading for mortar of highest strength lies somewhat lower; for crusher sand higher; for sand of elongated splinters near curve 7. It was possible to conclude further from the experiments, that the approximate composition of the sands depends on the cement content of the mortars, so that it is to be recommended to choose the grading of the mortar directly from the proportions of the mix. If, according to this, mortar is made from river sand conforming to curve 5, Fig. 3, then the sand must

contain, with smaller cement content of the mortar, more fine particles; thus:

Grading	0—0.2	0.2—1	1—3	3—7	mm.
For 1 part by weight of cement and 3 parts by weight of river sand..	0	13.3	40	46.7	%
For 1 part by weight of cement and 6 parts by weight of river sand..	12.5	11.7	35	40.8	%

The results in Fig. 4, for mortars 3 to 9, according to Fig. 3, confirm what has been said for river sand (Rhine sand). Mortars composed according to curves 3 to 9, Fig. 3, worked at the same consistency, yield compressive strengths according to Fig. 4. Mortar 5 proved itself the best, independent of the cement content.

The same procedure was followed with mortars of double-crushed basalt crusher sand with gradings according to curves 5 to 10, Fig. 3. Fig. 5 shows that here mortar 6 is to be chosen for achievement of highest strength.

If concrete is produced with river sand and gravel in such a way that mortar 5, Fig. 3, and the gravel are proportionately graded, then with 40 per cent and 60 per cent mortar content of the concrete are found the curves indicated in Fig. 1. The line for concrete with 40 per cent mortar corresponds to a concrete with the lowest mortar proportion possible in practice. Comparison with the curve, according to Fuller and Thompson, shows that our line of the gravel concrete of highest strength runs lower in the range of fine particles. The same thing is to be concluded from Fig. 2. If concrete is produced with 60 per cent mortar, then the corresponding curves indicated in Figs. 1 and 2 obtain.

From such considerations I recommend the devotion of special attention to the most important part of the concrete, the mortar, and thereby the composition of the mortar. The composition of the mortar which as a rule yields the highest strengths is, according to what has been said, known. The construction engineer must judge how the particular requirements are to be met.

Stone Dusts

The judging of the mortar according to the screen curves recommended also applies in the case of the addition of trass or other stone dusts, also of loam and clay.

If stone dusts are added to the mortars which show too little fines, the strength is increased; if enough fines are already present, the strength falls with further admixtures (see *Zement* 17, 1928, p. 1500). These findings hold good for fine materials which have usual granular shape (rounded, or simple splinters). If the particles of the admixture have out of the ordinary forms (as the honeycombing of kieselguhr, or mica flakes) then the material is suitable for admixtures in only very slight amounts (see *Zement* 17, 1928, p. 1501). A great deal has already been said concerning the effect of the shape of the coarse constituents, so that a discussion can be omitted here (see *Bauingenieur* 7, 1916, p. 398).

Bending Strength

Everything that has been said about concrete up to this point has been based on tests in compression. As already noted, further researches have been made in recent years to determine to what extent these data hold good when other properties are concerned.

In the bending strength of the concrete, it has likewise been proved that the mortar strength is the determining factor. Mortar 5, Fig. 3, which can stand for mortar of river sand of highest strength, gave—as a whole—also the highest bending strength, as shown in Fig. 6. With double-crushed basalt crusher sand, mortar 5 or 6 was of the highest value, again in conformity with the results of the tests in compression.

Further Properties

In the matter of contraction and expansion, the mortars which with equal consistency required the lowest amount of water gave the slightest alterations in length, as shown in Fig. 8 (*Zement* 17,

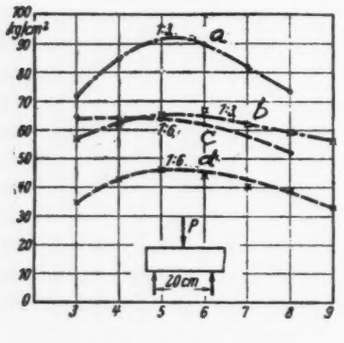


Fig. 6. Bending strengths of mortars 3 to 9 (Fig. 3) at 12 months. Storage 14 days moist, 1½ months in the air, then under water—(a, b, c, d) as in Fig. 4

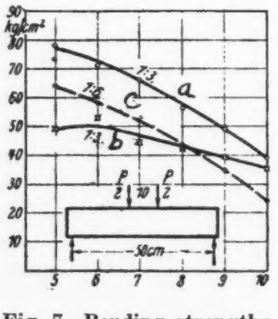


Fig. 7. Bending strengths for mortars 5 to 10 (Fig. 3) with basalt sand at 2 months—(a, b, c) as in Fig. 4. Storage 14 days under damp cloths, then in the air

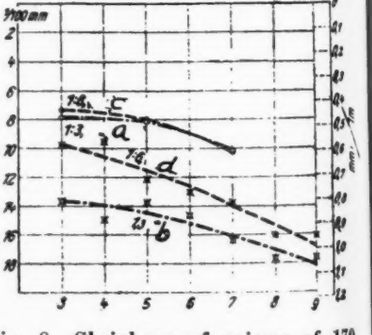


Fig. 8. Shrinkage of prisms of 170 mm. length, from mortars of different particle grading (mortars 3 to 9 of Fig. 3)—(a, b, c, d) as in Fig. 4

1928, p. 1634). These results also lead to the recommendation that mortars with river sand be proportioned as much as possible according to curve 5, Fig. 3, and selected not finer than necessary.

Tests on resistance to wear showed that wear remained less for the coarse mortars than for the fine. In recent times mortars have many times been produced which showed not more wear than good granite.

Permeability to water was smallest with river sand following curve 5, Fig. 3 (*Zement* 17, 1928, p. 1665). With respect to the resistance to chemical attack, the observations do not yet appear sufficient to be able to give a comprehensive opinion. Investigations are in progress.

Concrete roads require concrete of good quality. There are concrete roads which have been called excellent and which have fully lived up to expectations. We have had occasion to investigate, under many different conditions, how concrete of high ability to withstand compression, impact, wear, etc., and slight shrinkage, can be produced from the cements and mineral aggregates under consideration. In these investigations it has always been found that the grading of the particles should be according to the results of the experiments discussed. The amount of the coarse parts should be as large as is feasible; the consistency of the concrete should be as stiff as will still allow the proper working with the tools available, because the large pieces decrease shrinkage; the greater addition of water, however, has the opposite effect. The stone should be chosen according to the principles that hold for road construction in general, with regard to the fact that stones with smaller coefficient of expansion hinder shrinkage more than stones of more yielding nature (see *V. D.I.Zeitschrift* 68, 1926, p. 413).

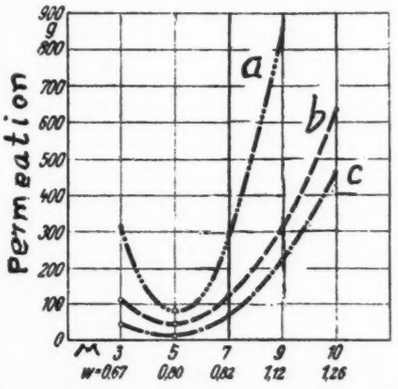


Fig. 9. Permeability of mortars of different grading (mortars 3, 5, 7, 9, and 10 of Fig. 3) and of different water-cement ratios. Plastic mortar of 1 part by weight of portland cement and 6 parts by weight of Rhine sand. (a), during 165 hr. at 7.5 atmospheres. (b), during 76 hr. at 2 atmospheres. (c) during 44¼ hr. at 1 atmosphere

The present-day knowledge of the properties of concrete have found successful application in leading cement products factories. Also in construction work it is to be acknowledged that more care is devoted to the proportioning of concrete than formerly.

Activities of the National Sand and Gravel Association

The National Sand and Gravel Association has been quite active during 1929 and has accomplished a great deal in the way of advancing the progress of the industry as a whole. The Association has endeavored to keep its members informed of the improved methods and developments that have taken place and has continued to devote constructive efforts along the line of research and engineering. As the year approaches its end, the Association is considering the advisability of holding a trade practice conference in cooperation with the Federal Trade Commission. Standardization and simplification of sizes of sand and gravel is being proposed.

The year's activity began with the thirteenth annual convention, held in January at Cleveland, Ohio. R. C. Fletcher, of Des Moines, Ia., was unanimously re-elected president and has fulfilled the trust placed in him by the members, having served in the capable and progressive manner which marked his previous administration. One of the interesting features of the convention was the symposium of papers and discussions concerning the ready-mixed concrete industry. The machinery exhibit also proved highly instructive, the new developments in equipment attracting the attention of the members throughout the meeting.

Under the direction of Stanton Walker, the Engineering and Research division of the Association has continued its work with worth-while results. Considerable engineering information was disseminated during the year to the members, through technical bulletins and loose-leaf data sheets. The research laboratory, established in 1928, has been enlarged and new equipment has been added to enable it to function properly. Various investigations were completed and others are still under way. Many of the members took advantage of the facilities of the laboratory.

The problem of cleaning and repairing railroad cars was thoroughly considered by a committee of which J. C. Buckbee was chairman. The committee cooperated with the National Crushed Stone Association and the National Slag Association. The railroads also aided in the investigation with the result that some valuable information was obtained. The average cost of car cleaning and repairing for sand and gravel operators was found to be 46.5 cents. For the crushed stone producers it was found to be 26.7 cents, and for slag, 38.4 cents. The survey also proved that the drop-bottom gondola was the most expensive to clean and repair.

The Association is now making extensive preparations for the next annual convention, to be held at Memphis on January 28, 29 and 30. It has every reason to believe that the Memphis gathering will be, without doubt, the "biggest and best" in the history of the Association.

Progress and Development in the Use of Cement and Concrete During the Year 1929

ON THE basis of incomplete but reliable data, 1929 shipments of portland cement in the United States amounted to a total which is about 2 per cent less than that of 1928.

While production itself, during the first ten months of the year, lagged approximately 4,000,000 barrels behind production for the same period in 1928, shipments were proportionately lower, with the result that stocks of finished cement at the mills were 2.5 per cent higher than a year ago.

According to statistics compiled by the Bureau of Mines, U. S. Department of Commerce, the ratio of cement mill operations to capacity in the twelve months ending November 30, 1929, was 66.8 per cent, as compared with the twelve-month period ending April 30, 1929, during which the ratio of production to capacity was 71.1 per cent.

During the month of November, 1929, both production and shipments of portland cement were more than 6 per cent less than in November, 1928.

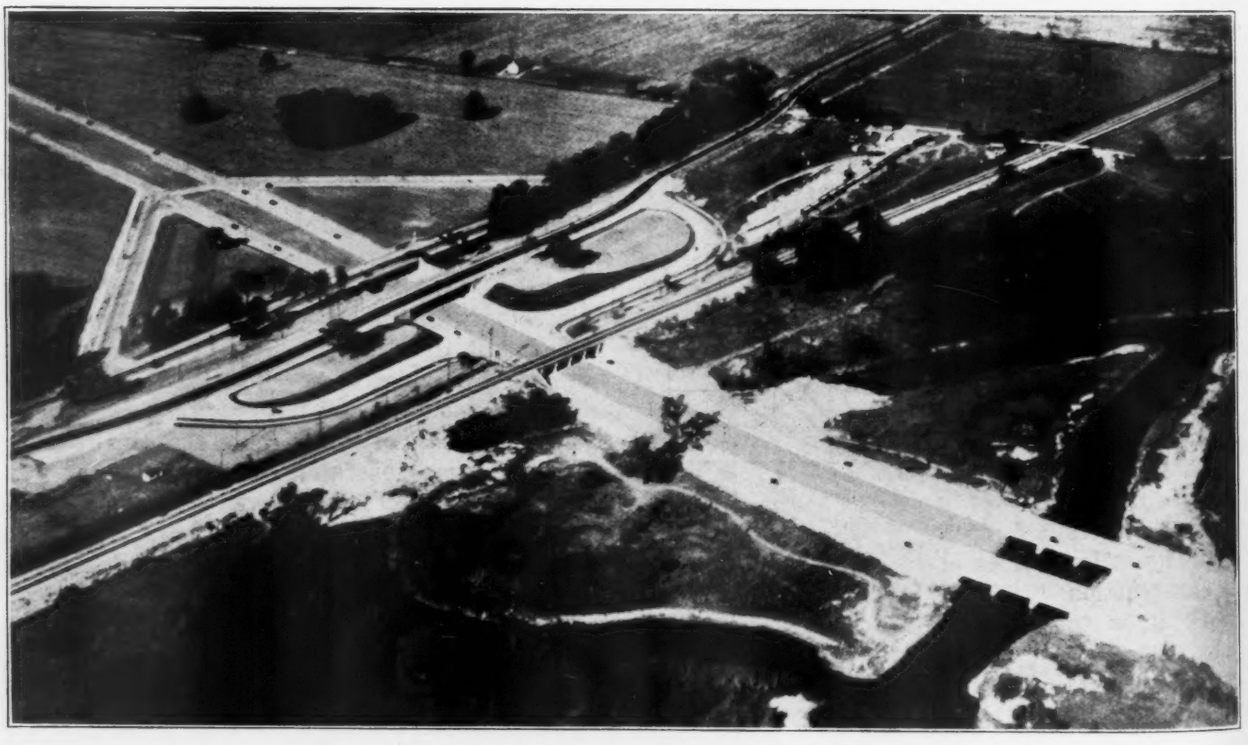
Concrete Road Progress

It is likely that the 1929 highway figures will show a small decrease from the records set in 1928, when 9,000 miles of concrete paved roads were constructed. New York State has paved nearly 1,000 miles of 18-foot concrete highways during the year; Michigan comes next with approximately 800 miles; then, in succession, come Iowa with 760 miles; Illinois with 730 and Missouri with 600 miles. Many other states have awarded fall contracts for construction during 1930.

Approximately 50,000,000 sq. yd. of concrete street pavements were built during the year. The necessities of the motor age have forced many municipalities to highway widening programs. During 1929 counties which have undertaken highway widening projects to bring their main traffic arteries up to a width of 40 feet or more, include Wayne County, Mich.; Cook County, Ill.; Milwaukee County, Wis.; Los Angeles County, Cal.; New York, New Jersey, Pennsylvania and Illinois have undertaken widening work on the basis of state highway construction.

Grade separations continue to demand the attention of governmental units where motor traffic is at its heaviest. 1929 leaders in this form of construction were: Westchester County, N. Y.; Wayne County, Mich.; and various state and county units in California.

The urgent demand of commercial aviation for concrete pavements at airports has resulted in the construction of more than 20 concrete-paved runways for taking-off and landing at United States



Outstanding highway and grade separation accomplishment of the year, the crossing of two superhighways, near Detroit, Mich.

airports during the year. The new Detroit City Airport alone contains the equivalent of 12 miles of concrete highway pavement in its system of concrete runways, taxi-ways, aprons and drives.

A review of the outstanding concrete structures built during the year can include mention of only a few of the many projects completed or now under way.

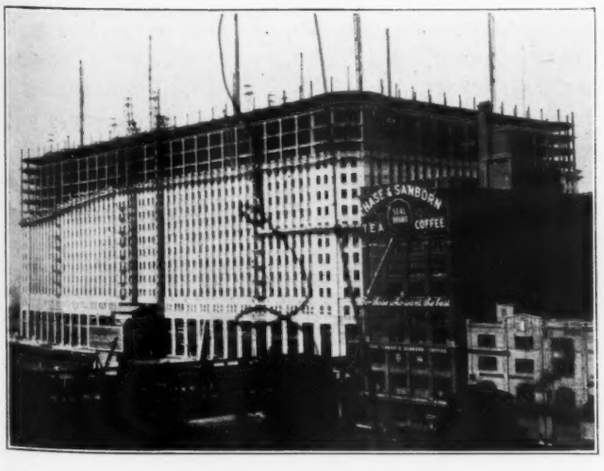
During the summer construction was completed of the Pardee Dam in the foot hills of the Sierra Nevada Mountains in California. This project, which established a record in speed of construction, required 615,000 cubic yards of concrete, all of which was placed in less than 24 months. In the building of this dam a number of construction records were broken; for example, in a single 24 hours, 3,600 cubic yards of concrete were placed and the resulting concrete averaged a strength of 1,300 lb. per sq. in. more than was called for by the specifications.

Two other large dams were constructed during the year. The Diablo Dam on the Skagit River in Washington required 316,000 cu. yd. of concrete, while the Bull Run Storage Dam at Portland, Ore., required approximately 220,000 cu. yd. of concrete.

One of the major engineering projects in connection with the Mississippi River flood relief is the large spillway which has been under contract in the New Orleans River district. This spillway, known as the Bonnet Carre Spillway, will require approximately 135,000 cu. yd. of concrete in its construction.

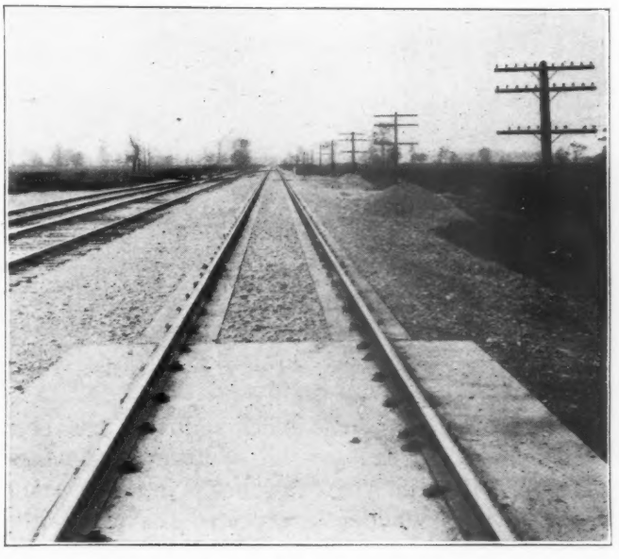
Another important use of concrete in flood relief is to be found in the extensive system of revetment or subaqueous mats being installed along the Mississippi to prevent the undercutting of banks and dikes. More than 1,000 acres of revetment mats were placed in the Memphis, Vicksburg and New Orleans river districts during the year.

The appreciation of concrete as a medium for architectural expression has gained considerably among architects, particularly on the Pacific Coast, where monolithic clubs, churches, theatres, schools and libraries are to be found in growing numbers.



New Merchandise Mart at Chicago, the Largest Building in the World

More than 72 acres of concrete floors are to be found in the Merchandise Mart, now nearing completion in Chicago. In the construction of this building, said to be the largest commercial building in the world, concrete was employed for fireproofing the entire structural steel frame. About 46,000 cubic yards of concrete were required for the caissons on which the structure stands. A total of 3,915,000 cu. ft. of concrete is contained in the finished building.



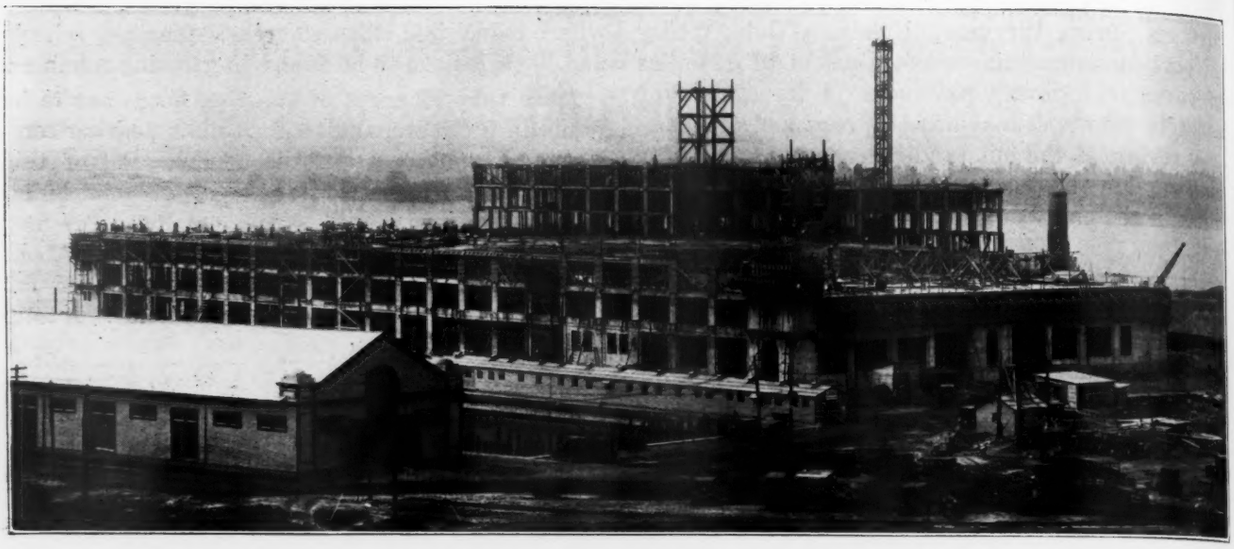
New concrete roadbed on the Pere Marquette R. R. near Beech, Mich. The full slab in the foreground was built two years ago

The tallest concrete building so far undertaken is a 32-story office building now being erected on the edge of Chicago's "Loop"—the Trustees Security Building, Thielbar and Fugard, architects. The employment of a new type of column is one of the unique features of this building.

An all-concrete trestle bridge, the San Francisco Bay Bridge, extending more than seven miles across San Francisco Bay, connecting San Mateo and Mount Eden, was completed early in the year. This bridge, which is operated for vehicles only, under a toll system, was constructed entirely of precast concrete units, manufactured twenty miles from the scene of the work and transported by barge. The entire project was built at a cost of $7,500,000. In this, as in other important work of the year, great care was taken to observe the facts and implications of the "water-cement ratio law" and other laws of modern, scientific concreting.

The general term "concrete products" embraces a wide variety of important uses of concrete. Concrete masonry, concrete manhole block, stucco, poles and standards, roofing tile, drain tile and cast stone are among the various products included.

Concrete masonry is one of the most important



Reinforced concrete building of the Canadian Rail & Harbors Terminals, Ltd. under construction

of these and the industry it represents is growing rapidly due to the application of modern selling methods and merchandising programs. The use of light-weight aggregates in masonry units is believed to be increasing rapidly.

The concrete manhole block industry has been materially expanded by the addition of 30 new plants during the year. Properly organized and financed, it is confidently expected that the outlet for the increased production can be realized.

From the point of view of architects the adoption by the American Concrete Institute of standard specifications for the quality of cast stone is an important achievement for the year 1929. The standardizing of cast stone establishes general confidence in a material which can be of the utmost value to architects and builders.

Concrete contractors in general are recognizing the increased demand for concrete floors in residences, swimming pools, tennis courts and other works requiring painstaking attention to details of landscape architecture as well as to the structural elements involved.

Railway Roadbeds

The railways, always extensive users of concrete, are among the most important American industrial units to lead the way in the new technique of concrete. That is, they have been forced to commit themselves very extensively to the scientific developments of concrete within the last several years and the results are plainly visible in the high quality of work being obtained.

During 1929 continued efforts were made by the engineers of several railways to develop a concrete roadbed or a system of concrete ties. The Pere Marquette Railway, which for several years has been experimenting with solid concrete roadbeds, inaugurated during the year a new type of experimental concrete roadbed utilizing precast concrete slaps which can be carried on flat cars and set in place and adjusted on the old subgrade by ordinary derrick equipment. The Union Produce Terminal at Detroit is essentially a concrete job throughout. Approximately 10 miles of track serving this Terminal are completely embedded in concrete, thus producing a practically rigid type of construction.

A railway project of unusual proportions is the Suisun Bay Bridge being built across San Francisco Bay by the Southern Pacific Railway. In building the piers for this bridge it was necessary to go down 143 feet below mean low water to reach bed rock. As a consequence the total height of several of the piers is 214 feet.

Other important railway construction during the year includes the flat slab railroad viaduct carrying four tracks 2,400 feet along the Columbus, Ohio, Fair Grounds; an exceptionally large warehouse built by the D. L. & W. at Hoboken, New Jersey, and the new passenger station of the New York Central Railway at Buffalo, N. Y., where nearly three miles of tracks are carried on concrete slabs.

Since 1924 there has been a rapid expansion in the construction and use of both plain and reinforced concrete pipe for the construction of sewers, culverts, water supplies, irrigation and drainage lines. In 1924 about 400,000 tons of concrete pipe were produced in this country. Since that year the increase has been rapid with the 1928 total reaching about 1,750,000 tons. According to present indications, the production of concrete pipe for 1929 totals approximately the same tonnage, indicating a fairly well stabilized market.

The diversity of use to which concrete pipe may be put is indicated by the fact that plain, unreinforced concrete pipe is produced in diameters ranging from 4 inches to 24 inches; and reinforced concrete pipe is available in sizes from 24 to 108 inches in diameter.

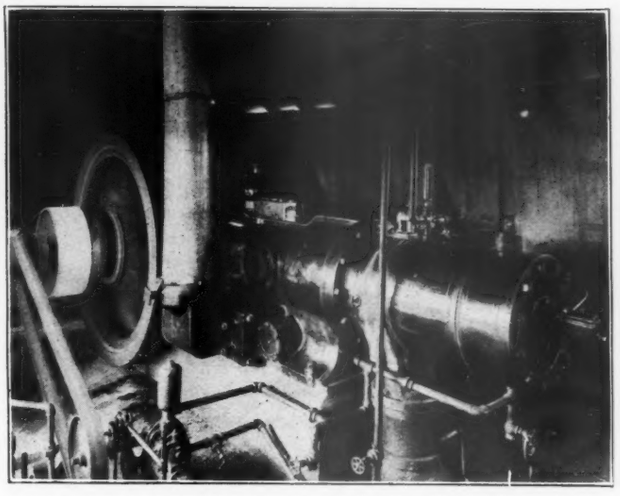
Rockport Stone Company Produces Material Used as Top Dressing for Local Roads

Entire Plant Driven By a Single Semi-Diesel Engine Which Has Been in Continuous Operation for Six Years

THE Rockport Stone Company operates a small crushed-stone plant near Beaver Dam, about 6 mi. northwest of Bluffton, Ohio, which produces top dressing for road work in the vicinity. The plant has a capacity of 160 tons per day and has been in operation for about six years. A single semi-diesel engine operates the entire plant, including hoists, crushers, screen, and elevators.

The property consists of about 7 acres. The overburden, averaging 3 ft. in depth, is removed by slip scrapers and teams. The stone is highly stratified and very much broken up to a depth of about 70 ft. where it becomes more massive. The quarry face, which is about 25 ft. high, is shot down by double-row staggered bank shots using 40 per cent dynamite. A Keystone well-drill with a 4-in. bit is used for drilling. The broken-up nature of the stone gives a yield of over 5 tons of stone to a pound of dynamite and renders secondary shooting unnecessary.

The stone is shoveled by hand into Austin 1¼-cu. yd. steel end-dump cars on narrow-gauge track which are hauled by a horse to the foot of the incline to the plant. An Austin single-drum hoist using Broderick and Bascom "Yellow Strand" cable hauls the cars to the top of the incline where they discharge into the Allis-Chalmers No. 3 primary gyratory crusher. The crusher discharges into an Austin belt bucket elevator which feeds an Allis-Chalmers Gates 36-in. by 8-ft. revolving screen with ¾-in. perforations. The oversize from the screen goes to a 48-ton capacity wooden bin which overflows into the Allis-Chalmers Gates No. 2 secondary crusher. This discharges back into the same bucket elevator to the screen. The material passing through the screen goes to a second 48-ton capacity bin. Both discharge



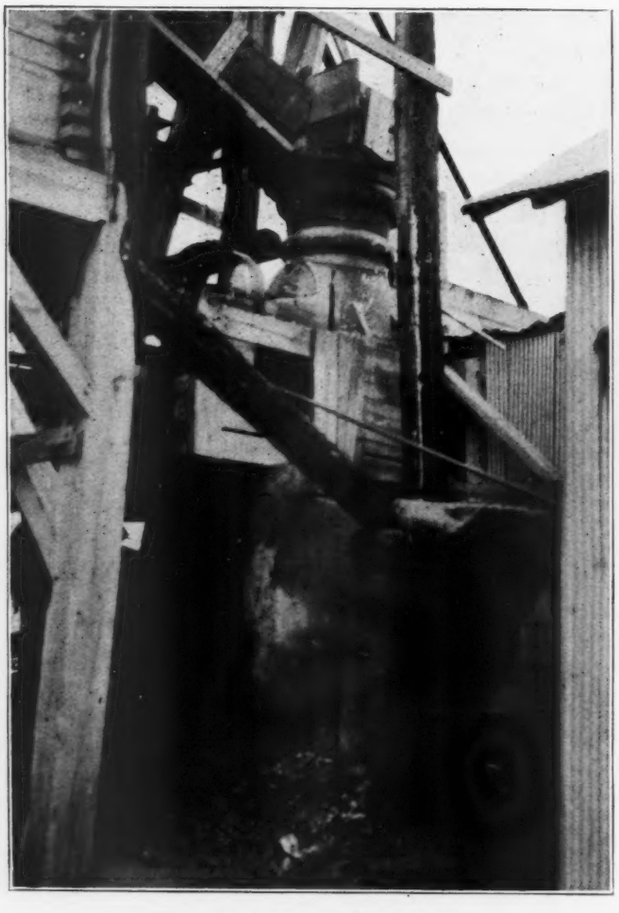
Semi-diesel 75-hp. low compression horizontal engine operating plant of Rockport Stone Company

Quarry and plant of Rockport Stone Company showing cars of stone being loaded

Employees lined up in front of the office, Supt. Floyd Everett at left. Most of these men have been in the employ of the company since operations were first started

through bottom sliding gates into trucks for delivery.

All of the plant equipment is belt-driven from a line shaft which in turn is belt-driven by a Primm 75-hp. Type CSBU low-compression horizontal semi-diesel engine. This engine has been in continuous operation since the plant was first built. When a part of the plant, including the engine room, burned down in June, 1926, after being struck by lightning, the engine came through the fire undamaged. The engine also drives a 115-volt generator which lights the plant, a small Power



The gyratory secondary crusher

Loading a car of stone in the quarry. Note fragmentation of the stone in the face

Manufacturing Company air compressor which pumps air to three tanks used in starting the engine, and a small water pump for cooling the engine. Manhattan Condor belting is used for all drives.

A frame office building near the plant houses a Fairbanks 8½-ton capacity beam scale for weighing out trucks. Superintendent Floyd Everett also has his office here. There is also a small blacksmith shop for making repairs.

Transverse Strength and Elasticity of Slag Concrete

THE National Slag Association of Cleveland, Ohio, is publishing a series of symposiums describing the characteristics and uses of blast-furnace slag. Symposium No. 19, entitled "Transverse Strength and Elasticity of Slag Concrete," quotes statements made by well-known authorities and abstracts articles from various engineering magazines and technical papers on this subject.

Until recently the compressive strength of concrete has been considered a sufficient indication of the quality of the concrete and not much attention was given to transverse strength. The following quotation from an article, "What Are the Most Significant Tests for Concrete?" from the 1926 *Proceedings* of the American Concrete Institute sums up this subject as follows: "Where high transverse strength is an essential quality, we cannot rely on the compression test to tell us whether or not we are obtaining concrete of the particular quality desired, and we had better resort to a cross-breaking test." Wherever possible in the symposium both compressive and transverse strengths are given so that any relation between them can be readily seen.

Center and Third-point Loading

The earlier tests for transverse strength consisted of supporting a beam near each end and applying the load to the center-point or to two points a third of the distance from each end. Prof. Duff A. Abrams in "Flexural Strength of Plain Concrete," published in the 1922 *Proceedings* of the American Concrete Institute, gave the results of tests made on beams loaded at the one-third point. These showed slag concrete to be fully the equal of concretes containing other aggregates.

Tests reported by F. H. Jackson and J. T. Pauls, engineers of the U. S. Bureau of Roads, and published in the 1924 *Proceedings* of the American Society for Testing Materials under the heading, "Accelerated Wear Tests of Concrete Pavements," gave some interesting results. Ten stones and nine gravels, from as many different sources, and five slags were used in this test. The test averages gave the slag the higher transverse strength with stone second, while the compressive tests reversed this order. The one slag concrete sample containing slag sand gave the highest strength; all of the others contained river sand.

Prof. Curtis C. Myers, University of Cincinnati, found that reinforced concrete beams made with slag aggregate were stronger than those made with stone or gravel. A 1:2:4 mix was used, tested at 28 days. Results were published in an article, "Slag Makes Light and Strong Concrete," in *Engineering News Record*, May 16, 1918, as follows:

"The beam made of crushed stone failed at 2,500 lb., and the first crack appeared at 1,750 lb. The beam made of pebbles failed at 2,200 lb., and the first crack appeared at 1,000 lb. The beam of slag concrete stood 2,500 lb. with no sign of failure except small tension cracks, and the beam at the conclusion of the test was sound, ringing when tapped with a hammer."

Static Loads

A popular test of the strength of a concrete beam or slab in the past consisted of piling several tons of pig iron or other heavy material on the member and measuring the deflection. W. S. Ferguson, of the Carey Construction Co., Cleveland, Ohio, described such a test in "Slag for Building," published by the Cleveland Furnace Company in 1907.

"We have just completed a very severe test on a concrete beam and floor slab at the Fireproof Storage Company's new building. A load of 34,000 lb. was placed on a section 7 ft. wide by 9 ft. long over the center of a typical beam, this load being equal to a superimposed load of three times the estimated live load. The material used for loading consisted of cement in jute sacks, applied in layers of 36 sacks at intervals of one-half hour until half the load was on. It was then allowed to set over night and completed in the same manner the following morning. The ultimate deflection was less than 5/64 in."

Tests of Mortars

Dr. A. Guttman, Research Director, Eisen Portland Cement Association, Dusseldorf, Germany, in "Use of Slag in the Building Industry," published in 1919, reports a very favorable relation between the compressive strength and the bending or transverse strength of slag mortar. He says:

"This happy ratio of bending to crushing strength in slag and mortar can be seen at once to be of great value in regard to its resistance to shrinkage stresses."

Cantilever Loading

"A summary of the cantilever beam tests made by the Pennsylvania Highway Department on pavement jobs during 1928 shows practically the same strengths for slag and stone concretes in the several mixes. Weight proportioning was used

in a 1:2:3½ mix, with compensation for moisture contained in the sand. Volume proportioning was used in 1:2:3¼ mix, with allowance for bulking of the sand, and in 1:2:3 mix with no such allowance. A 1:2:4 mix was also used for base course."

Tables in the symposium give detailed accounts of these tests.

Modulus of Elasticity

"The elastic property of concrete (expressed by the Modulus of Elasticity) is closely allied to the transverse strength. If the elastic strength is low, the concrete will reach its elastic limit under even a small load, and will rupture, giving a low modulus of rupture (or transverse strength).

"The modulus of elasticity may be determined either through the compression or the transverse test, by noting the deformation occurring throughout the test, with instruments devised for that purpose. The object is the same in either case—to determine how much deformation will occur in the concrete before it fails; in other words, how 'elastic' it is."

Stanton Walker, in his paper, "Modulus of Elasticity of Concrete," published in the 1919 *Proceedings* of the American Society for Testing Materials, reports tests from which he came to the conclusion that:

"There is no marked difference in the modulus of elasticity and strength of concrete made from high-grade pebbles, crushed limestone, crushed granite or blast furnace slag."

Prof. Curtis Myers in the same article previously quoted concludes from a series of tests made at the University of Cincinnati that:

"Concrete made with slag and bank sand shows greater elasticity and resistance to fracture than does pebble concrete."

Tensile Strength

"In the cantilever transverse test, the under surface of the concrete beam is in a state of compression, while the upper one is undergoing tension stresses. The reverse is true when center or three-point loadings are used. Since concrete will withstand much greater compressive stresses than tensile stresses, a concrete beam invariably breaks in tension, and to this extent a transverse test may be considered a tension test. This may account in part for the meager data on straight tension tests, coupled with the fact that it is extremely difficult to test concrete in pure tension without setting up other stresses in the specimen."

Philip Aylett, member, American Society of Engineers, in an article, "Track Depression of Seaboard Airline Railway," published in *Engineering News Record*, October 1, 1908, says of slag concrete used in the building of an underpass for a railway in Birmingham, Ala.:

"The concrete produced has proved to be of excellent quality; tensile and compressive tests of specimens several years old, as well as examinations of the structures with chisel and drill, show the strength and durability to be entirely satisfactory."

Shearing Strength

"If forces traveling in opposite directions are applied simultaneously to the under and upper surfaces of a concrete beam at points several inches apart, a shearing stress is set up. The shear test is thus in effect a double transverse test. No data are recorded on such tests of slag concrete beams." E. P. Gangewere, Testing Engineer, Lehigh University, in an article, "Tests of Brick Made from Slag," published in *Concrete*, August 15, 1922, reports tests of a mortar brick, made with granulated slag and cement, which showed a shear strength of 1,650 lb. per sq. in.

Conclusion

"In summing up, it may safely be said that the ultimate transverse strength of slag concrete is at least equal to that of other concretes, and in some cases higher. The lack of a standard method of making this test necessitates great care in comparing test results from different laboratories; unless the conditions of test are identical, such a comparison is of little value. The type of machine used has a decided effect on the results obtained, as shown in the variation between the Clemmer-Burggraf machine and that used by the Ohio Highway Department (22 per cent greater average strength with the latter). It is also probable that the size of the coarse aggregate has a bearing; a large piece of aggregate resting in the plane of cleavage will affect the beam's resistance to transverse strain considerably. The size of the beam will also have an effect, some laboratories using a beam 6 in. by 8 in. in cross-section, others a 6 in. by 6 in. specimen."

"Looks Forward to HANDBOOK"

PIT AND QUARRY,
Chicago, Ill.

Gentlemen:

Herewith enclosed is our renewal for PIT AND QUARRY and we shall look forward to receiving the new HAND BOOK as we would not care to be without one.

Yours very truly,
Tygart Limestone Co.,
(Signed) H. W. Hillman, *Manager.*

Northern Indiana Brick Company Operates Modern Sand-Lime Brick Plant at Mishawaka, Ind.

Efficient Equipment and Elimination of Waste Combined Make Operation of This Plant Unusually Economical

THE Northern Indiana Brick Company, of Mishawaka, Ind., operates one of the most modern sand-lime brick plants in the Middle West. This plant, which uses only the most up-to-date types of equipment, went into operation on May 28, 1928 and has a capacity of 30,000 bricks per day. During the summer months, however, the plant is operated 18 hr. per day and produces as high as 55,000 bricks.

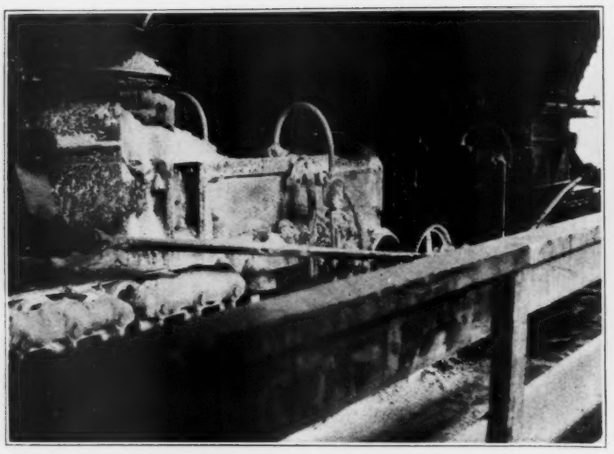
The main plant building is of fireproof construction with concrete floors, sand-lime brick walls and steel-sash windows. Ample space has been left for possible future expansion. This building also houses the boiler room, the machine and blacksmith shop, the lime storage room, and a locker and rest room for the employees. Most of the equipment used in the plant, including the sand drag scraper, Volumeter, bins, rod mill, brick press, hardening cylinders, cars, conveyors, and drive shafts, pulleys and sprockets, was furnished by the Jackson and Church Company.

The property of 27 acres on which the plant is located lies on E. Jefferson Road between South Bend and Elkhart just outside of the city limits of Mishawaka. The deposit, which consists of a good quality of sand and gravel with very little clay and practically no stone over 2 in., has been tested to a depth of over 60 ft. The 2 ft. of black dirt overburden is removed by team slips. The pit is kept dry by a 2-in. suction centrifugal pump which is belt-driven by a 7-hp. Western Electric motor.

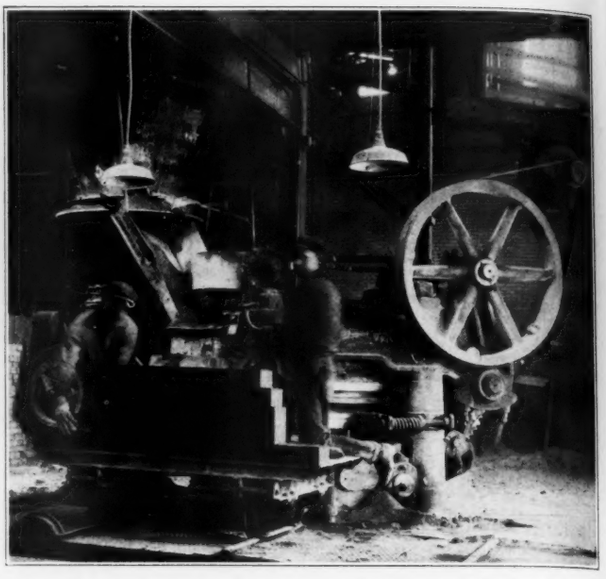
Hoist house in foreground with scraper and conveyor at right

The sand and gravel is excavated by a Jackson and Church ½-cu. yd. drag scraper operated by a 2-drum hoist in a neat frame hoist house at the edge of the pit near the plant. The scraper discharges into a small hopper which feeds a 16-in. inclined belt conveyor on 80-ft. centers to the

Plant from northwest with open and covered storage in foreground. Hoist house and conveyor at right



Closeup of Volumeter with lime feeder at left and sand feeder at right



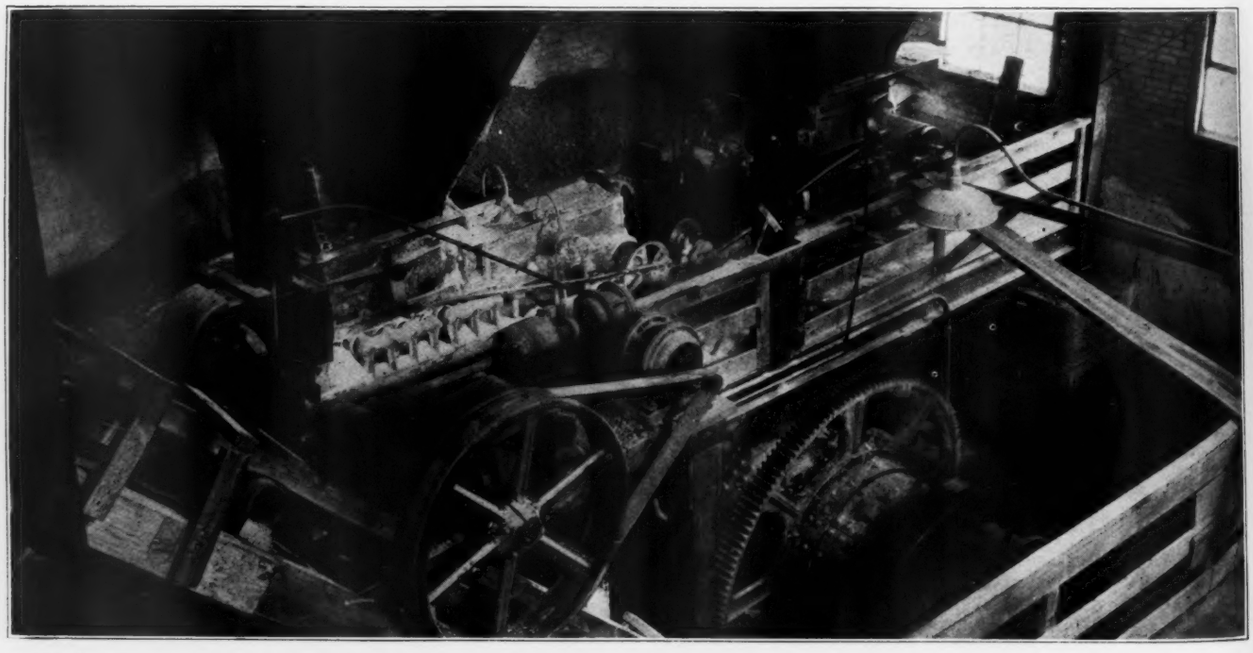
Loading brick from press to cars. Table feeder at left

plant. The hoist is belt-driven by a 20-hp. Western Electric motor.

The conveyor discharges on the second floor of the plant to a 2-ft. by 4-ft. single-deck Niagara vibrating screen with ½-in. mesh wire cloth. The conveyor is belt- and gear-driven at the head pulley by a 10-hp. Western Electric motor and the conveyor belting was furnished by the Boston Woven Hose and Rubber Company. The screen is belt-driven from the same motor. The oversize from the screen goes to a waste pile. A small jaw crusher is to be installed during the winter which will eliminate this waste. A sand washer, probably of the cone type, will also be installed to insure a clean product. The material passing through the screen goes to a steel bin over the Jackson and Church Volumeter which proportions the sand and lime.

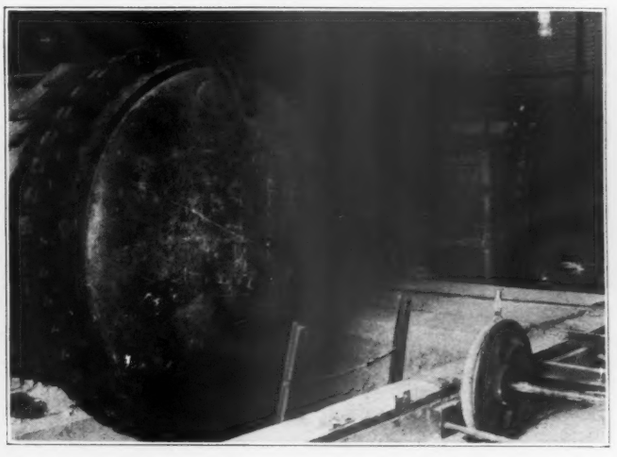
The hydrated lime used in the brick is purchased sacked in carload lots. Most of it comes from the Bedford district in southern Indiana. This is unloaded and dumped into a hopper feeding a brick-enclosed Smith chain bucket elevator. Whenever possible, the lime is unloaded as needed. There is also storage space for sacked lime with a capacity of four carloads. The elevator discharges through a chute to an 8-in. steel-enclosed screw conveyor 30 ft. long which feeds the bin over the Volumeter.

The Volumeter bins have capacities of 75 tons of sand and 28 tons of lime. Rocker feeders discharge these materials onto two converging belt conveyors. Each conveyor is driven through a Foote mill-type speed reducer by a 1-hp. Westinghouse motor. An automatic rapper attached to the lime bin, driven through a Foote speed reducer



Looking down on Volumeter at left, rod mill at right in pit and cleated conveyor to press feeder in foreground. Magnetic separating pulley, short conveyor and generating set for separator on platform above conveyor in center

The vibrating screen which separates out coarse sand



Loading ends of the two hardening cylinders. Part of transfer car at right

by a small electric motor, keeps the lime from sticking in the bin.

The Volumeter discharges the proportioned sand and lime into a Jackson and Church rod mill which pulverizes and mixes the sand and lime while adding the required amount of water. The mill is driven through a peripheral gear drive by a 50-hp. Western Electric motor and is located in a concrete pit below ground level. The mill discharges to a cleated belt conveyor on a 45 deg. angle which feeds the brick press. This conveyor is belt- and gear-driven by a 5-hp. motor. A Dings magnetic pulley located on a platform about half-way up the conveyor a few inches from the upper surface of the belt takes out any metal in the mixture. This is carried on a short belt conveyor to a receptacle on the platform. The pulley is driven by a 1-hp. motor. A small motor generator set for magnetizing the separator pulley is also located on the platform.

The cleated conveyor discharges into a hopper over the brick press. This has a paddle agitator belt-driven by a 20-hp. Allis-Chalmers motor and discharges by means of a revolving plate feeder into the Jackson and Church twelve-brick press. This is driven through a Texrope drive by an Allis-Chalmers electric motor.

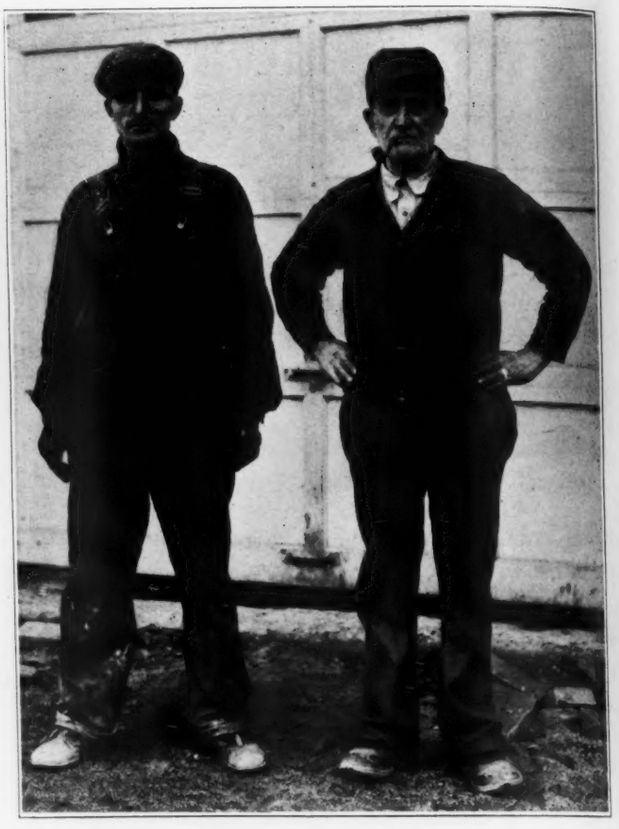
The bricks are loaded by two men onto Jackson and Church steel flat cars which hold 1,150 bricks each. These are rolled onto a transfer car which hauls them to the hardening cylinders. The transfer car is operated by cable from a drum driven through a James worm-gear speed reducer by a Westinghouse 1½-hp. motor. The two Jackson and Church 7-ft. by 70-ft. hardening cylinders are asbestos lined on the outside and have a capacity of 25 cars each.

Plant from southeast showing loading platform and railroad siding. Lime storage room and elevator in center

Cleated conveyor to press feeder with small brickbat crusher at left

After the bricks have hardened sufficiently in the cylinders, the cars are again run out onto the track and onto a turntable which allows them to be sent in any of three directions. The storage space is covered and is in the shape of a letter U, the center being a sunken driveway for trucks at such a depth as to facilitate loading. The cars can be run straight across the turntable to load directly onto trucks, or to either side for storage. The bricks are unloaded from the cars onto a Mathews Conveyor Company gravity roller conveyor which can be moved to feed any part of the storage space. The same conveyor is used for handling brick either direct from the cars or from the storage piles into railroad cars on a siding alongside the plant for shipment.

Steam for the kilns is furnished by a 125-hp. hand-stoked, hand-fired boiler in a boiler room which is part of the plant building. This keeps the hardening cylinders under a steam pressure of 120 lb. for 10 hr. This boiler also has a connection to the sand pit so that well points can be used to thaw out the deposit in freezing weather. The hardening cylinders are also connected to these points so that when they are blown off each morning this otherwise wasted steam can be used for the same purpose, effecting a considerable economy. Under extremely severe conditions these well points are used 24 hr. per day.

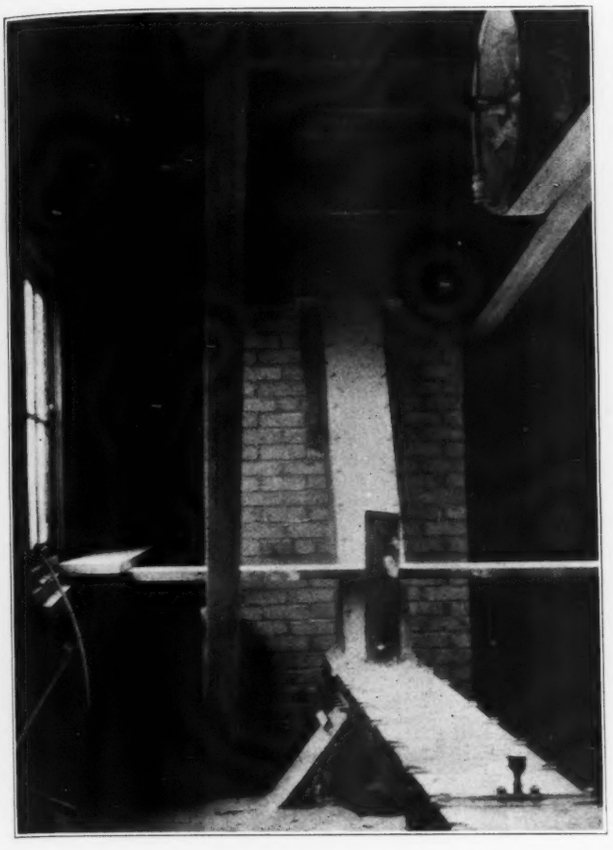


Superintendent C. N. Reppert at right with Henry Merritt, mechanic, at left

The boiler room also houses the plant pumping equipment. An Alamo Engine Company plunger pump furnishes the water from a 70-ft. well. This water is used for all plant operations and is also fit for drinking. The pump is driven by an Allis-Chalmers 3-hp. motor through a Texrope drive and has a Cutler-Hammer regulator which keeps the water supply tank at 35-lb. pressure, automatically starting and stopping the pump motor as the pressure varies.

A Worthington 3½-in. by 2½-in. by 4-in. steam-driven reciprocating pump furnishes water for stoking. There is also a small Gardner boiler feed

Plant from southwest showing hoist house and conveyor



Lime elevator and discharge to screen conveyor feeding Volumeter lime bin

pump which feeds the pure condensed water from the hardening cylinders back to the boiler, thereby eliminating the necessity for boiler compounds of any kind.

A small jaw crusher driven by a 25-hp. General Electric motor is used to grind up any waste or spoiled brick. A 50-ton capacity chain hoist suspended from a structural steel beam over the rod mill is used to handle repair parts. Smaller chain hoists at each end of the hardening cylinders handle the heavy steel doors when they are opened or closed. All drive belts are Manhattan Condor and Crouse-Hinds electric conduit is used throughout. Square D and Noark safety switches and Westinghouse magnetic controllers are used. Fire protection consists of Elkhart Brass Manufacturing Co. and Pyrene fire extinguishers.

Most of the bricks produced are used in South Bend and Mishawaka for backing up and semi-face brick. They have also been used in many large buildings in Chicago and are universally accepted. They have an average absorption of 14 per cent and an average crushing strength of 3,000 lb. per sq. in. Shipments are mostly made by truck in the summer and by rail in winter. The company owns a 1,200-ft. siding from the main line of the Elkhart and Western Railway, which is a branch of the New York Central.

The main office building is a neat one-story brick and concrete structure with steel sash windows. Officers of the company are: James Morley Zander, president; E. R. Newland, vice-president; Wm. F. C. Dall, secretary; and Chester A. Perkins, treasurer. C. N. Reppert is plant superintendent. Previous to the time this plant went into operation the company operated a plant at Michigan City which was abandoned because of the scarcity of sand of the right kind.

Commercial Standard for Feldspar Proposed

As a result of the misunderstanding and confusion that has attended the buying and selling of ground feldspar, the division of trade standards has been requested by the Feldspar Grinders' Institute, to cooperate in the establishment of a standard classification for grades. Feldspar is used quite generally throughout the ceramic industry as an important component in the manufacture of porcelain dinner ware, pottery, electrical porcelain, enamelware, floor and wall tile, vitreous china, plate and other kinds of glass.

It is one of the most valuable materials entering into the manufacture of the above named products, and until recently, it has been bought and sold on rather loose designations. Because of consequent losses of time and money through misunderstandings, the producers, through their trade organizations, the Feldspar Grinders' Institute, have, in cooperation with the Bureau of Standards, evolved a proposed commercial standard which was submitted to all interested organizations for comment at a general conference held on January 14 under the auspices of the Bureau.

New Edition of a Standard Book on Minerals

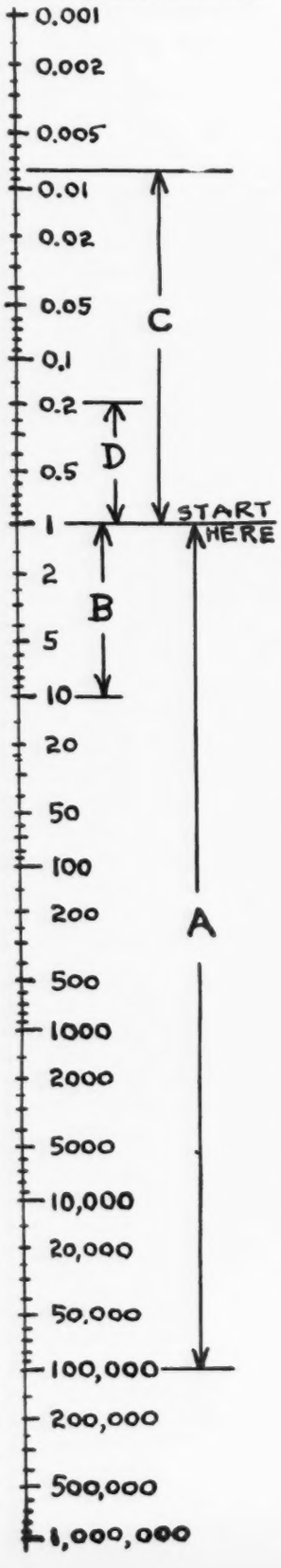
"Dana's Manual of Mineralogy" was accepted years ago as the standard authority on all matters pertaining to technology of minerals. Its first edition was in 1848. The 14th edition appeared recently under the authorship of Prof. William E. Ford of Sheffield Scientific School of Yale University who collaborated in numerous previous editions with Prof. Edward S. Dana. Its price is $4 net and may be had from the publishers, John Wiley & Sons, Inc., New York.

The book is so well known that it seems almost needless to review it. It covers the subjects of crystallography, physical properties of minerals, chemical mineralogy, descriptive mineralogy, and determinative mineralogy. Not only is it used as a college textbook but it is a valuable reference book for every person who has interests in any of the mineral industries.

Any Root or Any Power of Any Number

W. F. Schaphorst

Several years ago I wrote an article on this same subject which aroused considerable interest. But one letter which I received contained this comment: "The writer has just seen your chart for extracting any root of any number. If you will now tell us how to do the same with fractions and how to keep track of the number of digits in any case whether expanding to a power or extracting a root, we will erect a monument in your honor."



Whether or not this is a challenge, I do not know. If it is, I hereby accept the challenge. Not that I am looking for a "monument in my honor" but to show that it can be done and to give you something that I consider really valuable. I have prepared another chart which I trust will clarify matters for all time and which I am submitting herewith. Without doubt this is vastly superior to my previous chart. Besides, I doubt that anything like this has ever before been published. I shall tell you how I made it.

If you will take any slide rule and lay it end to end nine times and each time lay off the principal dividing lines you will have a chart exactly like this excepting that yours will be much longer and therefore it will be much more accurate. That is what I did in preparing this chart. Then I reduced it to this much smaller size. By following the above method you can make a chart that will go into the billions, trillions, or higher, as one limit; and a billionth, trillionth, or lower, as the other limit. There is no limit in fact. Then to keep track of the digits you simply read the numbers exactly as they stand on the chart. No juggling of digits is necessary. I do not know of any other method that is as simple as this. All other methods require "juggling of digits," as they say.

For example, what is the 5th root of 100,000? Measure the distance A from 1 to 100,000 as indicated on the chart. The distance B must then be exactly 1/5th of the distance A and there is your answer, namely, 10. In other words, divide the distance A by the root and the quotient shows you the distance to measure from 1 to find the answer. Always measure from "1" in either direction. "One" is always the starting point. To extract the square, cube, or other root of fractions is usually more complex than extracting roots of whole numbers. However with this chart one is just as easy as the other.

For example, what is the cube root of .008? Measure the distance C from .008 to the starting point "1" and divide it by 3 and you get the distance D which tells us that the answer is 0.2.

A method that is as easy as any to find a third, fourth, fifth, etc., of any distance, is to use a pair of dividers. Adjust the dividers until you get the distance D exactly 1/3 of the distance C and the chart gives the answer without any mathematical calculations whatever. With this chart you can determine the 3.127 power for instance—ANY power in fact. And you can extract the 4.37 root or any other root, all without mathematical jugglery. The "beauty" of it is: You have everything before your eyes in black and white.

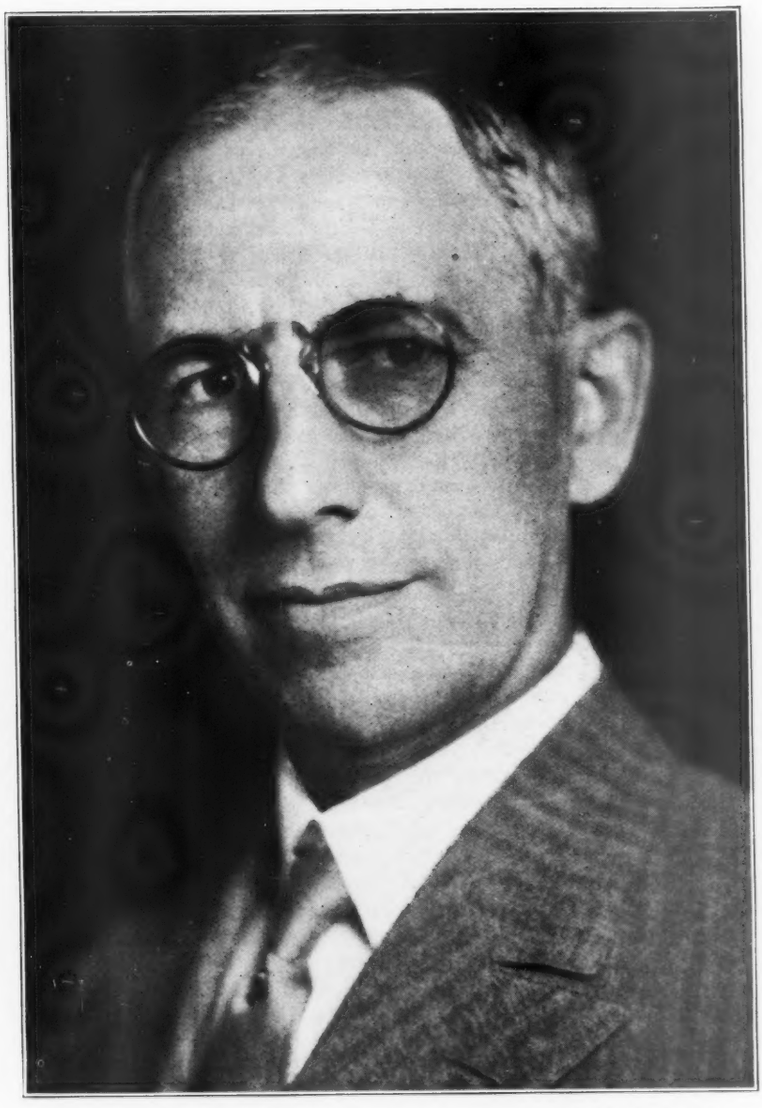
Wire Saw Saves Slate Industry Large Sums

Approximately 30 wire saws are at present in almost constant use by 20 different slate-producing companies operating in the Pennsylvania district, according to Dr. Oliver Bowles, United States Bureau of Mines, Department of Commerce, who recently visited that district. It is estimated that during 1929 the intrduction of the wire saw into the Pennsylvania slate industry will have accomplished a saving of at least a quarter of a million dollars. Not only have production costs been greatly reduced, but much of the enormous waste of raw materials that resulted from previous methods of operation is now avoided.

The data contained in three previous reports on the use of the wire saw in slate quarrying, Serials 2820, 2851, and 2918, have been condensed and combined with much new information for a Technical Paper which will be published by the Bureau of Mines within the next few months.

MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.



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George Kilian
Secretary-Treasurer, Pennsylvania-Dixie Cement Corp.,
New York, N. Y.

Annual Report of the Geological Survey

In its annual report, recently released, the Geological Survey, of the Department of the Interior, states that during the past year it did geologic work in 42 States and Alaska. In this work 13 of the States cooperated. The cooperative work takes a variety of forms but consists mainly of the study of specific problems on a cost-sharing basis. Considerable geologic work was also done in cooperation with other Government organizations and with non-governmental scientific associations.

The investigations in search of potash, carried on in cooperation with the Bureau of Mines, were continued in New Mexico, where four sites for Government core drilling were selected, and in Texas, where drilling at four sites was completed.

Volcanologic studies were carried on in California, Alaska, and Hawaii. Numerous paleontologic determinations were made. Investigations of ore deposits, coal, oil shale, and other minerals and studies in glacial geology, stratigraphy, and structure were continued. In the chemical laboratory 5,880 samples of potash salts were examined and a total of 8,910 specimens were analyzed.

The principal explorations conducted by the Geological Survey in Alaska in the field season of 1928 were made in southeastern Alaska, the Copper River region, the Mount Spurr region of the Alaska Range, and the region north of the Tanana River. The work in southeastern Alaska consisted of reconnaissance topographic mapping in the Ketchikan district, with the aid of the aerial photographs taken by the Navy Department in 1926, and of a detailed survey of a small tract in the Juneau region for the Forest Service. The Mount Spurr expedition accomplished the topographic and geologic mapping of 1,000 square miles of new country. In the Tanana region the major geologic features of an area of nearly 4,000 square miles were mapped. Six field projects were in progress at the end of the fiscal year 1929, including topographic studies in southeastern Alaska, in connection with the airplane photographing expedition of the Navy Department, geologic reconnaissance in the Copper River and Yukon-Tanana regions, and geologic and topographic reconnaissance in the Alaska Range. Some of the work in southeastern Alaska is being done for the Forest Service. Special assistance is being given to the Alaska Railroad in solving problems that arise in its work in which geologic information is useful. The supervision of operations under leases issued by the Government for extracting coal and oil on public lands was continued during the year, a small staff being maintained at two local offices in Alaska for this purpose.

The topographic work was done in cooperation with 25 states, county officials in two states, the War Department, the Corps of Engineers, and the Colorado Metal Mining Fund, and the area mapped amounted to 17,333 square miles in 29 states, the District of Columbia, and Hawaii. Of this total, 12,956 square miles represents new surveys, 4,049 square miles resurveys, and 328 square miles revisions. The total area mapped to June 30, 1929, is 1,327,234 square miles. Nine states and the District of Columbia are now entirely mapped, and the percentages in other states range from 8 to 88.6. Of the total continental United States, exclusive of Alaska, 43.6 per cent has been mapped. Cooperation was continued with the Air Corps, United States Army, whereby aerial photographs were furnished for use in topographic mapping. A base map of California was prepared, and the base map of Arkansas was revised. A partial culture and drainage map of the Tensas Basin, Louisiana and Arkansas, was compiled for the Mississippi River Commissioner.

The work on water resources is done largely in cooperation with other Federal bureaus, with state, county, and municipal agencies, and with permittees and licensees of the Federal Power Commission. The amount expended by state, county, and municipal agencies for such work during the year, in part directly and in part through the Geological Survey, was $367,929.66. This sum covered work in 35 states and Hawaii. Including the cooperative work, the study of surface waters, which consist primarily of the measurement of the flow of streams, was carried on in 47 states and Hawaii, in which at the end of the year 2,238 gaging stations were being maintained. The work on ground-water resources has been planned to meet the more and more exacting public demand for precise information with increasing need for the water. Investigations relating to ground-water and power or reservoir sites were made in 22 states. Research into the principles of hydrology has been continued to provide a more secure basis for ground-water investigations. Cooperation was continued with well drillers' associations with a view to developing higher standards and better results in water-well drilling.

The work of classifying public and Indian lands with respect to mineral content and of supervising mineral operations on such lands was carried on in 21 states and Alaska. The number of cases involving land classification acted on during the year was 15,428, and the results accomplished include net decreases of 57,000 acres in the area of outstanding coal withdrawals, of 92,140 acres in outstanding petroleum withdrawals, and of 26,261 acres in outstanding phosphate reserves. Definition of the "known geologic structure" of producing oil and gas fields was continued, and at the end of the year the net area so defined was 515,378 acres in seven states. There was a net increase of 245,808 acres in the area included in power reserves, making a total of 6,479,570 acres in 20 states and Alaska, on which about 15,000,000 continuous horsepower can be developed. The net increase in enlarged-homestead designations was 142,493 acres, and the net increase in stock-raising homestead designations was 1,141,957 acres.

The production of petroleum on public lands during the year was 22,458,842.62 barrels, of natural gas 22,770,394,110 cubic feet, and of gasoline 47,319,874.32 gallons, on which the royalty, rentals, and bonuses amounted to $3,685,883.35. The production of coal on such lands was 1,022,860.90 tons, of phosphate rock 21,792.06 tons, and of sodium 23,580.90 tons, on which the royalty, rentals, and bonuses amounted to $414,186.11. Supervision over oil and gas operations on naval petroleum reserves was continued, and the production was 8,116,635.98 barrels of petroleum, 7,711,858,000 cubic feet of natural gas, and 24,908,262.82 gallons of gasoline, on which the royalty value was $1,817,464.45. Inspectional, regulatory, and advisory service was rendered in connection with the leasing of mineral deposits on Indian lands in seven states, with a royalty value of approximately $7,500,000, nearly all in Oklahoma.

Shooting Many Blast Holes Simultaneously

Modern large-scale operations in mining and construction have brought about the necessity of firing large numbers of holes simultaneously. Until fairly recently this has been practical only where a power circuit was available. A new system has been devised for increasing the capacity of a blasting machine for firing large numbers of caps. It is found that when detonators are hooked up in graded series nearly three times as many can be fired.

National Safety Council Official Suggests Plan For Systematized Safety Meetings

By W. DEAN KEEFER
Director, Industrial Safety Division

[*About this time annually men and organizations lay plans for betterments. In all kinds of industrial activities an increasing interest is being manifested in the prevention of accidents. Many organizations conduct systematic practices and hold regular or periodic meetings. Others are desirous of inaugurating such practices. The following article will prove valuable to both the experienced and the prospective directors of safety meetings.—Editor.*]

THE organization of safety committees in a quarry or a mill serves a two-fold purpose. It arouses and maintains the interest of the management, superintendent, foremen and workers in accident prevention, and tends to eliminate the idea that "safety is the business of the safety department only."

It is often exceedingly difficult for the safety man to plan the sort of programs that will really further accident prevention and make the meetings beneficial to a maximum degree. The safety engineer may be somewhat at a loss to know where to find material which will keep up interest in the meetings.

In an effort to assist individual companies or plants in the pit and quarry industries in forming safety committees and in holding safety meetings, the National Safety Council has outlined a plan which may be followed by a committee chairman. The plan calls for a safety meeting each month, and it includes detailed outline of programs to be followed in each meeting. These safety meetings may be committee meetings or may be combined committee and general meetings.

Every safety meeting should be conducted in an orderly manner. A study of hundreds of safety committee programs indicates that it may be well to follow some such order of business as the following:

Call to Order. Meeting should be called to order promptly at the appointed time.

Roll Call. Names of persons present and absent should be recorded. Members who cannot attend should notify the chairman in advance. The reasons for their absence should be noted in the minutes. If the meeting is large, attendance cards may be signed by those present.

Approval of Minutes. A day or two following each meeting, the secretary should give each member of the plant safety committee a copy of the minutes. It is unnecessary, therefore, to read these minutes at the next meeting. Any corrections to be made should be called to the secretary's attention, and after the corrections have been considered the rest of the minutes should then be approved, unread.

Unfinished Business. A report should be presented on each outstanding recommendation of the committee. If certain recommendations have not been carried out, the reasons should be given and noted in the minutes. All matters on which no definite decisions have been made should be brought up for reconsideration.

For instance, John Jones may report that the new guard for machine No. 22, recommended by the safety committee, has been completed and installed; William Brown may report that repairs on crane No. 3 are 50 per cent complete, that all work must be done at odd moments when the crane is not in operation, and that the job will be finished within a day or two. George Smith may report that he has written to the National Safety Council to find out how other concerns safeguard the operations of a screw conveyor. He might present a summary of the Council's reply and then submit a definite recommendation for approval by the committee.

Reports of Committees. The chairman should ask various sub-committees to present their reports. All or certain parts of these reports should be discussed and accepted or rejected. If necessary, each committee should be given instructions about the additional work it must do.

Review of Accidents. Some member of the committee should tell briefly all that is known about each accident that has occurred since the preceding meeting. Perhaps he can exhibit a stereopticon slide or a photograph illustrating conditions surrounding the accident. He may be able to display the goggles that saved an eye, the chain that broke, or a model of the guard that was not in use. Perhaps each accident should be discussed with the injured worker, one or more of his fellow workers, or his supervisor. In each case, the committee should decide who was responsible and why. Discussion should follow and the committee should agree upon a definite plan to prevent a recurrence. The plan might include one or more of the following:

1. Recommend discipline of injured worker, one or more of his fellow workers, or his supervisor.
2. Formulate a new safety rule, or change an old one.
3. Display special safety posters referring to the types of accidents under consideration, using National Safety Council posters or posters secured from other sources.
4. Display the chain that broke or other exhibits when possible.
5. Take photographs showing the right and wrong ways to do "the job." Display them on shop bulletin boards, or reproduce them in the employees' publication.
6. Investigate conditions at the scene of the accident.
7. Install a new guard or improve the old one.
8. Recommend that better lighting be provided.
9. Start a clean-up campaign.
10. Devise new equipment or a new method of doing the job.

Discuss Accidents That Happened Elsewhere. Sometimes it is just as important to study near accidents as it is to study accidents that resulted in injuries to workers. Likewise it is good safety education to study accidents that have occurred in other plants, but which could happen in your own plant. Data on outside accidents can be secured from the National Safety News, trade journals, newspapers, Cement or Quarry News-Letters.

New Business. All new items of business should be presented for discussion, and for action by the com-

mittee. For instance, Otto Miller might suggest that a special safety rally should be held to which all workers and their families should be invited; Lester Owen might suggest a change in the safety rules for his department; and Henry Miller might call attention to the broken guard on hoisting engine No. 31.

Exhibit. A special exhibit might be displayed and discussed each month. This exhibit might include such things as the new types of goggles or leggins for workers in various departments, and the special posters to be used next month.

Introduction of Visitors. The chairman should introduce each visitor. Perhaps he will want to ask each one to make a few remarks.

The foregoing items are more or less routine matters which should be taken up at each meeting. Of course, the detail must be varied to fit your organization. At each Safety Committee meeting some definite subject should be discussed.

Addresses and Special Stunts. Arranging this part of the program gives the safety committee an opportunity to use its ingenuity in making each meeting different from the preceding one. Safety committee meetings need variety; the committee members need recognition and encouragement from the management, and they need new ideas to stimulate their thoughts and to keep them out of a rut. The following list suggests a few specialties that may be arranged from time to time.

a. Short addresses by such men as the president, general manager, state or insurance company inspector, company doctor, safety man from the neighboring plant, etc.

b. Exhibition of a motion picture or a set of stereopticon slides.

c. Read some special article from the National Safety News, trade journals, newspapers, Cement or Quarry section News-Letters, and other publications of the National Safety Council.

d. Presentation and discussion of a special Safe Practices Pamphlet.

e. Discussion of some special safety problem such as eye protection or a fire extinguishment.

Closing the Meeting. All the meetings should be conducted on a regular schedule and when the allotted time is up the meeting should be ended. The chairman can do a great deal by limiting the time for each speaker or subject.

The Safe Practices Pamphlet series of the National Safety Council will be of considerable help in preparing special meetings. The following pamphlets will be of particular interest to committee chairmen: No. 42, "Industrial Safety Organization"; No. 67, "Maintaining Interest in Safety"; No. 72, "Safety Committee," and No. 77, "Safety Meetings."

Monthly Programs

Following are suggestive programs to be used in monthly safety meetings. These are planned for use after the regular routine of business.

In outlining these programs, no effort has been made to present comprehensive information in the pit and quarry field. The programs are merely suggestive, calculated to stimulate thought on the different subjects mentioned. Safety men who wish to plan their own programs will find these programs models from which to work.

January Meeting

Past Year's Record. Review the accident record of the past year. Compare it with records of previous years and with the records of the other companies in the same industry. Compare accident costs, accident-frequency rates, and accident-severity rates for the entire plant or for each department.

How many recommendations were made by safety committee during the year?

How many were accepted and carried out by the management? How many were rejected?

Have you any data to show that the work of the safety committee has helped to improve operating efficiency?

Icicles. This is the time of year when icicles may fall and injure passing workers. Some action should be taken to prevent accidents of this kind.

Carbon Monoxide. Call attention to the danger of letting automobile engines run in closed rooms or garages. Many persons are killed every year by the carbon monoxide that comes from the automobile exhaust. Action should be taken to bring this information to the attention of all workers.

Remarks by Company Executive. The president or general manager or some other executive of the company should comment on the past year's safety record, giving praise where possible and encouraging the committee to continue its good work. He should pledge the complete support and cooperation of the management. Perhaps he will refer to several specific accidents that occurred during the past year, accepting the management's responsibility for dangerous conditions that formerly existed, and emphasizing the responsibility of the individual workers. It might be well for him to cite several specific accidents that occurred in other plants.

February Meeting

Remarks by Purchasing Agent. The chairman of the safety committee should notify the purchasing agent in advance that he will be called on to tell "how the purchasing agent can help the safety committee to promote accident prevention and how the safety committee can help the purchasing agent."

Perhaps the purchasing agent will congratulate the committee on the work which it has accomplished, and encourage the members in its continuation.

When purchasing equipment and supplies, it is well to specify that the manufacturer must furnish articles that already have incorporated in them all the safety features that are needed to insure their safe handling and safe operation.

The purchasing agent can do a great deal of constructive safety work in this way, but he, of course, is not a specialist in accident prevention, and very often he needs the advice of others who know what can and should be done by the equipment manufacturers. If the members of the plant safety committee will give the purchasing agent the benefit of their special knowledge, the purchasing agent can help them in solving some of the safety problems, which include designing home-made guards and securing their continuous use.

Falls. It is estimated that 14,000 persons are killed every year as the result of falls.

Some of the reasons for these falling accidents in plants and quarries are: a. Tripped or stumbled over something. b. Lost balance and fell from an elevation or into a hole. c. Slipped. d. Couldn't see. e. Caught heel of shoe.

Have we done anything to prevent falls? Have we made a survey of our plant to see what can be done to prevent falls? Ask each member of the committee to list the places where he thinks a worker might fall.

Appoint one or more sub-committees to make a survey of certain departments or of your entire plant. In-

struct each sub-committee to look for things that may cause falls, and to make recommendations that will prevent falls. Committees might take photographs of unusually good or unusually bad conditions. In making such a survey and in preparing their reports, the sub-committee member should answer such questions as:

Are there any dangerous projections from the floors or other walking surfaces?

Are there any dangerous holes in floors or other walkway surfaces?

Are there any stairways or ladders with defects that might cause falls?

Are materials piled in the aisles or are there any other obstructions to interfere with the safe movement of pedestrians?

Is oil, grease or water allowed to accumulate on any floor or walkway, making it slippery?

Are special non-slip surfaces needed at any particular point?

Are properly constructed handrails provided on all stairways and scaffolds and at floor and wall openings?

Is sufficient light provided at all places where darkness might cause a fall?

March Meeting

Exhibition of Stereopticon Slides. A series of 10 to 25 slides should be exhibited. These slides might:

Show how to safeguard certain machines or quarry operations.

Illustrate certain unsafe practices that are prevalent among the workers.

Show safe ways to do the same jobs.

Show accident statistics—for the plant or for each department, for the nation, in your industry.

Illustrate how certain accidents occurred in the shops or in outside work.

The National Safety Council has a collection of more than 2,000 film slides, any of which can be borrowed by members free of charge. Film slide projectors can be rented from the Council for $1 a day, not including the time of transportation. You can select the slides you want from the catalog which will be mailed to you upon request.

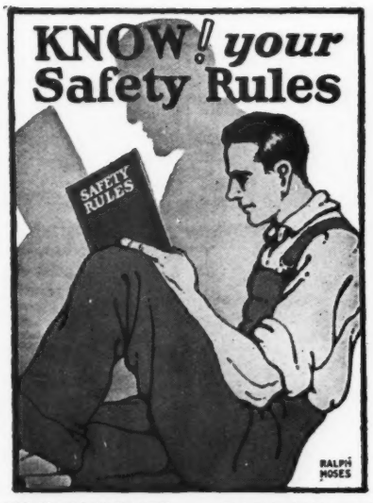
If you want special slides made from your own photographs, the Council will gladly have this work done for you at cost—which averages about 50 cents each.

If you want to make your own glass slides simply from typewritten "copy," the Council will give you a list of the few inexpensive materials you can buy locally and tell you how to use them. Many plants show a few slides at every safety committee meeting.

Electrical Hazards. Electricity is invisible and noiseless, and is responsible for a number of injuries and deaths in the pit and quarry industry every year. The dangers of electricity are from: a. Shock. b. Burns. c. Flashed eyes. d. Fire.

These may be caused by a short circuit, accidental ground, overload, or poor contact.

Electrical accidents would be decreased considerably both in number



FOREWARNED IS FOREARMED

and severity if we were at all times to follow the accepted standards for installing and using electrical equipment. Look over your records for the past few years and see if any of your workers have been killed or injured by electricity. Ask each member of the committee to enumerate and describe the places where electrical accidents are likely to happen.

Appoint one or more sub-committees to make a survey of certain departments or of the entire plant. Instruct each sub-committee to look for things that may cause electrical accidents and to make recommendations that will prevent them. Committees might take photographs of the unusually good or unusually bad conditions. These photographs may be made into slides and exhibited at the next committee meeting. In making such a survey and preparing reports, the sub-committee members should answer such questions as:

Is electrical equipment so elevated, isolated in special rooms, enclosed, guarded or insulated that danger to workers is minimized as much as possible? (Pay particular attention to high-voltage circuits and apparatus.) Is electrical equipment properly marked and the voltage designated?

Are fixed wires run in conduit wherever possible?

Are suitable warning signs properly located at places of unusual danger?

Are exposed non-current-carrying metal parts properly grounded?

Are insulated floor mats provided where needed?

Should enclosed switches replace the old type knife switches at any particular places?

Is the right kind of conductor cord used for portable lamps and other portable equipment? Is this equipment properly grounded?

Are the right types of switches, sockets, and other accessories used in these portables?

Is any organized effort being made to instruct the workers concerning the common electrical hazards by means of speeches, motion pictures, slides, posters, pamphlets?

Are workers familiar with the prone pressure method of resuscitation from electric shock, gas, asphyxiation, drowning?

[Programs for succeeding meetings will be published at regular intervals in PIT AND QUARRY, *in ample time to be useful to the safety leaders at plants.—*

NEW CORPORATIONS

Gypsum Co., c/o Walter S. Underwood of Scott, Bancroft, Martin & MacLeish, Attys., 134 S. LaSalle St., Chicago, Ill. $1,000,000.

Princeton Quarries, Inc., C. A. Williamson, Princeton, N. J. $125,000. Crushed stone.

Commonwealth Sand Co., John K. Watson, Sec., c/o Allegheny River Sand Corp., Empire Bldg., Kittanning, Pa. Frank R. Alter, Treas., Parnassus, Pa. $60,000. To mine sand.

Big Creek Gravel Co., Inc., Pollock, La. $20,000. J. A. Cook, Henry Williams.

Eastern Sand and Gravel Corp., c/o James H. Young, Land Title Bldg., Philadelphia, Pa. 5,000 shares com.

York Concrete Co., York, Pa. $5,000. Thos. I. Snyder, Treas., 518 Washington St.; and J. Victor Grimm, 421 N. 11th St., both of Reading, Pa. To produce ready mixed concrete.

Southern Mining Co., T. H. Haws, Pres., Walnut, N. C. John A. Shugart, Vice Pres., C. B. Haws, Sec. $200,000. To produce magnesite and feldspar.

International Phosphate Corp., G. G. Crawford, 601 Duval St., Tallahassee, Fla. 25,000 shares, $10 each. C. L. Waller, C. D. Robinson. This is Houston, Texas, concern incorporated by Leo Faust, Atty., Houston, Texas.

California Lime Products Co., c/o Chas. L. Gilmore, Sacramento, Calif. $2,000,000. Chas. Lumbard, Wm. Howard, G. T. Gunston, R. L. Hollingsworth, directors. To produce lime rock near Gorge, Towle P. O., Calif., and manufacture agricultural lime and carbon dioxide ice in plant to be built under direction of Smith, Emery & Co., consulting chemical engineers of San Francisco. Plant will have daily capacity of 200 tons of lime.

Washington Pacific Lime Co., R. F. Mather, Seattle, Wash. $150,000. Stuart Mannell, S. M. Brackett.

France Lime & Stone, Inc., Logansport, Ind. 20,000 shares n.p.v. (Subs. of France Stone Co.) Formed to consolidate firm's two plants at Logansport, Ind., where new stone crushing and lime plant is being erected.

Arkansas-Missouri Gravel Co., Gilbert G. Hill, Bloomfield, Mo. $70,000. D. D. Hill, Charleston, Mo.; Geo. Layton, Greenway, Ark. Office, Bloomfield, Mo.; plant, Greenway, Ark.

Bangor Crushed Slate Corp., Bangor, Pa. New corp. $50,000.

Bangor Central Slate Co., Bangor, Pa. New Corp. $60,000.

RECENT PATENTS

PIT AND QUARRY *will furnish, at its actual cost, a copy of any patent cited below. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.*

American Patents

Booms

Boom for excavating-machines. Robert R. Downie, Beaver Falls, Pa., assignor to Keystone Driller Co., same place, No. 1,739,952.

Boom and bucket for concrete-pavers. Charles E. Foote, Nunda, N. Y., assignor to Foote Co., same place. No. 1,739,392.

Cement Manufacture

Manufacture of cements. Antoine Bauchere and Gabriel Arnou, Paris, France. No. 1,739,383.

Collectors

Mechanical collecting container for cranes. William Polgar, Bronx, N. Y., No. 1,740,116.

Construction

Bulkhead-wall construction. Carl Weber, Jacksonville, Fla., assignor to Shore-Line Builders, Inc., same place. No. 1,739,108.

Device for working out calculations in connection with structures of reenforced concrete. Washington Sabatini, Oneglia, Italy. No. 1,739,523.

Material Handling

Disintegrating and conveying machine. Kenneth Davis, St. Benedict, Pa. No. 1,739,215.

Material-moving apparatus. Barton S. Snow, Wheaton, Ill., assignor to T. W. Snow Construction Co., Chicago, Ill. No. 1,739,099.

Measuring Devices

Liquid-measuring device. James E. Bushnell, North Plainfield, N. J., assignor to Ransome Concrete Machinery Co., Plainfield, N. J. No. 1,740,390.

Solution-feeding mechanism for concrete-mixers. Harry D. Wells, Concord, N. H. No. 1,740,324.

Mills

Crushing, grinding, and refining machine. Swinfen Bramley-Moore, White Plains, N. Y., assignor to Bramley Machinery Corporation, New York, N. Y. No. 1,740,194.

Comminuting mill. Ray C. Newhouse, Milwaukee, Wis., assignor to Allis-Chalmers Mfg. Co., same place. No. 1,739,855.

Ring-roll mill. Thomas J. Sturtevant, Wellesley, Mass., assignor to Sturtevant Mill Co., Boston, Mass. No. 1,739,487.

Four-high mill. Otto B. Lindquist, Tarentum, Pa., assignor to Allegheny Steel Co., Brackenridge, Pa. No. 1,739,156.

Pulverizers

Pulverizing apparatus. Ollison Craig, Worcester, Mass., assignor to Riley Stoker Corporation, same place. No. 1,739,213.

Screens

Screen. William C. Wilson, Port Washington, N. Y. No. 1,739,701.

Shovels

Power shovel. Holger L. Mitchell and Rolf Ljungkull, Milwaukee, Wis., assignors to Harnischfeger Corporation, same place. No. 1,739,175.

Stone-Hardening

Process of hardening alberene stone. Paul Mahler, New York, N. Y., assignor to Alberene Stone Co., same place. No. 1,738,956.

Transportation

Traffic-line and joint machine and method for producing same. John N. Heltzel, Warren, Ohio. No. 1,740,345.

Foreign Patents

Buckets

Grab-buckets. Milliken Bros. & Blaw-Knox, Ltd. British 319,919.

Building Materials

Plastic material for building. Cemsil S. An. It. French 671,094.

Artificial marble. J., J. C., and J. P. Ter Smitte. British 315,799.

Improvements in manufacture of hollow building materials. L. Avanzini. French 671,269.

Improvements in hollow brick and similar materials. E. J. Lesquendieu. French 671,338.

Production of Porous or cellular material from blast furnace slag. Willy Kinberg, German K. 112,602.

Cement

Process for cement manufacture. G. Imai. French 670,362.

Process for the production of an acid and fireproof cement by mixing an acid-proof lead compound with cement. A. Lehmann German 483,-110.

Production of fused portland cement from blast furnace slag and limestone. O. Keune. German 482,-327.

Process for the production of aluminous cement. U. Bellony. German 482,185.

Coloring magnesia cement. A. N. Jacobs. British 315,126.

Process of manufacturing cement. G. Imai. British 319,342.

Manufacture of phosphorus and alumina cement. I. G. Farbenindustrie, A. G. German 483,399.

Concrete

Concrete molding machine. J. Boux. French 672,044.

Machine for calculating construction in reinforced concrete. French 672,500.

Container for transporting mixed concrete. K. Hindliede. French 671,-112.

Concrete air gun. Svend Dyhr. German 482,486.

Charging device for concrete, clay, etc. G. Meisenhelder. German 482,-241.

Process and equipment for treatment of concrete. Maffai A. G. French 667,118.

Protection of concrete against wear. P. Lechler. British 319,288.

Production of reinforced concrete building materials. Ottomar Grimm. German G 64,375.

Manufacture of reinforced concrete pipe. Herbert Amphlett and Hugo Schmidt. German 482,036.

Crushers and Grinders

Crushers with gyratory heads. Nordberg Mfg. Co. British 319,616.

Grinding and crushing mills. A. E. G. MacCullum. British 316,907.

Spherical grinding element with semi-spherical prominences. Rosch A. G. German K 111,733.

Centrifugal mill. Fried. Krupp Grusonwerk A. G. German DRGM 1,096,985.

Simultaneous grinding and drying of water-bearing raw materials. Montan- und Industrialwerke. German M 107,587.

Ring-roller mill. Firma G. Polysius. German 464,106.

Combination mill with intermediate sifting. Fried. Krupp Grusonwerk A. G. German 482,630.

Drills

Electric pneumatic drills for working in rock, marble, granite, etc.. J. & L. Guillet. French 670,862.

Portable drilling machines. R. W. Keay. British 319,711.

Rock drills. Ingersoll-Rand Co. British 319,339.
319,179.

Rock drills. K. Brunzel. British

Dryers and Coolers

Drying, heating and cooling granular materials W. G. and F. R. Simon (Phoenix Wors, Nottingham). British 317,581.

Gypsum

Process for reduction of gypsum. Societe G. Polysius. French 667,200.

Form for gypsum blocks. Ludwig Schaefer. German DRGM 1,096,235.

Roller and breast mills. I. H. Pilot. British 319,865.

Miscellaneous Equipment

Scoop-arm machines. Lobnitz & Co., Ltd. & H. O. Ledgood. British 318,807.

Pit props. A. W. Lloyd. British 319,405.

Pit props. F. S. Atkinson. British 319,091.

Pit props. International Processes, Ltd. & A Ryner. British 319,800.

Pit props. J. Parker. British 320,098.

Apparatus for emptying pulverized materials from bins. Zeitzer Eisengiesserei and Machinenbau A. G. German 482,368.

Optical pyrometer. Rudolf Steck. German St. 44,743.

Mortar

New hydraulic mortar. Soc. Anonyme des Chaux et Ciment de Lafarge, etc. French 673,700.

Process for the production of mortars for roc-like material. Fabriken Dr. Kurt Albert. French 672,679.

Screens

Shaking device for screens and mixers. Kosmos G. m. b. H. Rudolf Pawlikowski. German K 108,072.

Washers and screen for gravel, sand, etc. Gerhard Hulskens & Co. **Washers**

G. m. b. H. French 672,194.

Foreign Applications

Rotary kiln cooler, in which cooling tubes are placed spirally around the combustion chamber. G. Polysius A. G. German P. 58,381.

Rotary kiln, in which more than half of the kiln cross section is filled with material to be burnt. A. Nillson. German N. 30,094.

Procedure for production of a material similar to basalt from siliceous substances. R. Mohr. German B 137,001.

Process for production of phosphoric acid and cements. W. Schroeder. German Sch. 86,930.

Process for transportation of slag. F. Stiepernitz. German St 43,511.

Container for mixing sand and water, with a bottom outlet for the material. L. Andrews. German A 51,621.

Process for the utilization of the steam formed in the wet process for cement. Antoni Eiger. German E. 35,754.

COMING EVENTS

Jan. 20-23, 1930. Cincinnati, O. Annual convention and Manufacturers' Division Exposition, National Crushed-Stone Association, at Hotel Gibson. J. R. Boyd, secretary, Merchandise Bldg., 14th and S Sts., N. W., Washington, D. C.

Jan. 20-22, 1930. New York, N. Y. Annual conference, National State Association, at Hotel Commodore. W. S. Hays, secretary, 644 Drexel Bldg., Philadelphia, Pa.

Jan. 21, 1930. New York, N. Y. Meeting, Metropolitan Section, American Society of Mechanical Engineers, Engineering Societies Bldg. Subject: "The Recovery of Dust from Pulverized-Coal-Fired Stacks."

Jan. 22, 1930. Birmingham, Ala. Portland Cement Association regional safety meeting, at Tutweiler Hotel. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

Jan. 28, 1930. Chicago. Steel Founders' Society of America, Inc., at Hotel Sherman. G. P. Rogers, managing director, 932 Graybar Bldg., New York.

Jan. 28-30, 1930. Memphis, Tenn. Annual convention and Manufacturers' Division Exposition, National Sand & Gravel Association, at the Peabody Hotel. V. P. Ahearn, executive secretary, Munsey Bldg., Washington, D. C.

Jan. 29-30, 1930. Milwaukee, Wis. Annual convention, Wisconsin Concrete Products Association, at Hotel Plankinton.

Feb. 4-6, 1930. New York, N. Y. Annual meeting Sand-Lime Brick Association, at Pennsylvania Hotel. Ellen Knight, secretary, Saginaw, Mich.

Feb. 4, 1930. Dallas, Tex. Portland Cement Association regional safety meeting, at Baker Hotel. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

Feb. 11-13, 1930. New Orleans, La. Annual meeting, American Concrete Institute, at the Roosevelt Hotel.

Feb. 11, 1930. Cincinnati, O. Portland Cement Association regional safety meeting, at Hotel Gibson. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

Feb. 16-20, 1930. Toronto, Can. Thirty-second annual meeting, American Ceramic Society at Hotel Royal York. Gordon C. Keith, secretary-treasurer, 49 Turner Road, Toronto 10, Canada.

Feb. 25-28, 1930. Wichita, Kan. Fifth annual Southwest Road Show and School at the Coliseum. Secretary, P. O. Box 1043, Wichita, Kan.

Feb. 25, 1930. St. Louis, Mo. Portland Cement Association regional safety meeting at Hotel Coronado, A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

Mar. 3-5, 1930. Chicago. National Management Congress, at Stevens Hotel. G. E. Pfisterer, manager, 308 W. Washington St., Chicago.

Mar. 3-7, 1930. Chicago. Industrial Equipment Exposition at Stevens Hotel. G. E. Pfisterer, manager, 308 W. Washington St., Chicago.

Mar. 3-7, 1930. Chicago. National Industrial Exposition at the Stevens Hotel. George Pfisterer, secretary, 308 W. Randolph St., Chicago.

March 4, 1930. La Salle, Ill. Portland Cement Association regional safety meeting, at Hotel Kaskaskia. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

Mar. 5-7, 1930. Chicago. National Industrial Equipment Exposition sponsored by the Society of Industrial Engineers, the American Society of Mechanical Engineers, the American Management Association, the National Association of Cost Accountants, and the National Association of Foremen, at the Stevens Hotel. G. E. Pfisterer, manager, 308 W. Washington St., Chicago.

Mar. 5-7, 1930. Chicago. Third National Materials Handling Meeting, American Society of Mechanical Engineers, at the Stevens Hotel.

March 18, 1930. Des Moines, Ia. Portland Cement Association regional safety meeting, at Hotel Fort Des Moines. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

March 25, 1930. Kansas City, Mo. Portland Cement Association regional safety meeting, at Hotel Muehlebach. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

Apr. 5-9, 1930. New York, N. Y.; Hoboken, N. J.; Washington, D. C. Fiftieth anniversary meeting, American Society of Mechanical Engineers, at American Machinist offices in New York; Stevens Institute, Hoboken; U. S. Chamber of Commerce Bldg., Washington.

April 7-11, 1930. Atlanta, Ga. Annual meeting, American Chemical Society.

April 15, 1930. Albany, N. Y. Portland Cement Association regional safety meeting, at Hotel Ten Eyck. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

PERSONAL MENTION

H. L. Fisher of the Saskatoon Sand and Gravel Company, Saskatoon, Saskatchewan, Canada, is visiting acquaintances in Chicago. He will attend the meeting of the Sand and Gravel Association in Memphis and proceed to Florida. Mr. Fisher is planning to make a study of the most advanced methods of washing and grading for the purpose of making an installation at the Saskatoon plant.

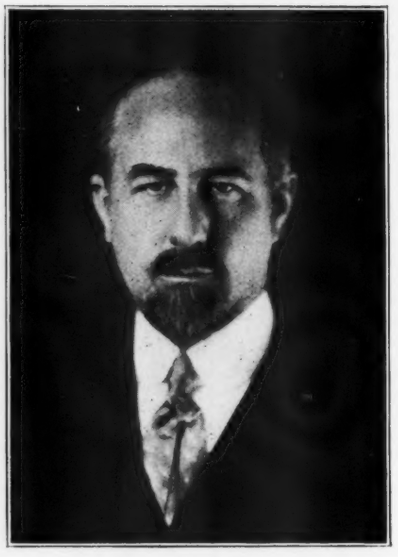
Ray M. Hudson, assistant director of the National Bureau of Standards, in charge of commercial standardization, resigned, effective Jan. 1, to become secretary of the Massachusetts division of the New England Council, with headquarters in Boston.

J. H. Belknap was recently appointed to the position of manager of Control Engineering Department of the Westinghouse Electric and Manufacturing Company at East Pittsburgh. He succeeds **E. B. Newill,** who resigned to become assistant to the president of the Delco Products Company, a subsidiary of General Motors Corporation. Mr. Newill will also be a member of the engineering development of the recently formed company that will manufacture radio sets under the license of Radio Victor Corporation.

F. W. Cherry, formerly district manager for the Universal Crane Company, Chicago, is now sales manager of the Jos. F. Kiesler Company, 938 West Huron street, Chicago.

John V. N. Dorr was mentioned in our last issue as having been designated to receive the James Douglas Medal for conspicuous achievement in hydro-metallurgical practice. This award will be made formally at the February meeting in New York of the American Institute of Mining Engineers.

It might have been considered irrelevant some years ago to discuss his achievements in a magazine devoted to the non-metallic mineral industries, but conditions have changed. Dorr apparatus was invented and developed, it is true, to serve gold-milling necessities; but, as has been the case with many other kinds of machinery and apparatus that were designed especially for metal mining or coal mining, several of the Dorr types have been found perfectly adapted to non-metal milling treatments. Dorr slurry mixers, classifiers, thickeners, and



John V. N. Dorr

sand washers have become familiar units in cement, sand and gravel plants.

Mr. Dorr, after an early association with Thomas A. Edison, graduated from Rutgers University and immediately became engaged in metallurgy in the Black Hills of South Dakota and Colorado, during which period he invented the classifier, thickener and agitator which bear his name and which are standard equipment in many practices of chemical, industrial and sanitary engineering as well as in all kinds of mining—metal, non-metal, and coal. He is president of The Dorr Company, Inc., of the United States; the head of associated companies in London, Paris and Berlin; and he has established representation in South Africa, Australia and Japan. In 1916 he was the recipient of the John Scott medal of the Franklin Institute. Rutgers University, which Mr. Dorr has long served as a trustee, in 1927 conferred upon him the honorary degree of Doctor of Science. He recently (December 12) returned from Japan, where he served as delegate to the World's Engineering Congress in Tokyo and expects to leave for South Africa the latter part of February.

H. A. Stevenson of 7310 Woodward Avenue, Detroit, Mich., has been appointed to represent the Lewis-Shepard line of lift trucks, stackers and skid platforms in eastern Michigan. Mr. Stevenson and his associates also represent the Baker line of electric industrial trucks in Michigan.

H. W. Munday, of 228 North La-Salle Street, Chicago, Ill., has just been appointed by the Schaffer Poidometer Company of Pittsburgh, Pa., as exclusive sales representative in the entire states of Minnesota, Iowa, Wisconsin, Michigan and the northern part of the states of Illinois and Indiana for the sale of the Schaffer Poidometer and Schaffer Hydrator. Mr. Munday is a graduate engineer with considerable experience in the cement, lime and gypsum industries, and was formerly general sales manager of the Huron Industries, Inc.

Joseph B. Shaw, for the past two years connected with the National Brick Manufacturers Association as engineer, has been appointed city engineer of Utica, N. Y., effective Jan. 1, succeeding Richard S. Cookingham. Mr. Shaw formerly served four years as assistant city engineer.

M. M. Moralee, realtor, Murphysboro, Ill., who recently obtained option on tract of land at Murphysboro, announces that a $1,000,000 plant will be constructed by a limestone crushing company. Two hundred men will be employed. Later reports mention H. K. Ferguson Co., engineers of Cleveland, Ohio, in connection with this project.

A. F. Marwick, formerly general sales manager for the Pettibone-Mulliken Co., has joined the Chicago district sales staff of the Taylor-Wharton Iron and Steel Company and William Wharton, Jr., & Co., Inc.

Lloyd Schwartz, district engineer of the Illinois Division of Highways, was drowned in the Mississippi River near Cairo, Ill., on Nov. 7. Mr. Schwartz was born at Golden, Ill., in 1889. He was graduated from the University of Illinois in 1911, and after serving one year as an instructor at that institution, entered the service of the Illinois State Highway Division. Shortly after returning from military service at the end of the World War in 1919, Mr. Schwartz was appointed district engineer, with offices at Carbondale, Ill., having charge of all highway activities of the department in fourteen counties of southern Illinois.

FINANCIAL NEWS
CORPORATE & BUSINESS

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

Warner Company's Net Income, $1,059,946

A consolidated report of Warner Co. and George A. Sinn, Inc., engaged in production, transportation and wholesaling of sand, gravel and lime products, from April 8 to September 30, 1929, shows net income of $1,059,946 after depreciation, depletion, interest, amortization, discount, federal taxes and surplus adjustment.

Income account for the same period follows:

Gross sales	$7,393,180
Costs, depletion, etc.	5,856,985
Balance	$1,536,195
Other income	63,094
Gross income	$1,599,289
Interest, amort. and disc.	369,836
Federal taxes	138,119
Surplus adjustments (net)	31,388
Net income	$1,059,946
1st pfd. dividends	103,512
2nd pfd. dividends	188,951
Common dividends	304,189
Surplus	$ 463,294

Pro forma consolidated balance sheet of Warner Co. and subsidiaries as of December 31, 1928 (based on balance sheets of predecessor companies at that date, adjusted to give effect to incorporation of Warner Co., the exchange of its common stock for the outstanding common stock of Charles Warner Co., its acquisition of net assets of Van Sciver Corporation and subsidiaries for part cash and $5,750,000 second-preferred stock, the sale of $7,000,000 first mortgage 6 per cent bonds and 31,500 shares of first preferred stock of Warner Co., and 11,473 shares of common stock of Charles Warner Co., and the liquidation of sinking-fund gold notes, bank loans, mortgages and dividends of predecessor companies), follows:

Assets

Land, mineral deposits, bldg. equip., after depletion	$17,227,691
Cash	529,430
Accounts and notes receivable	1,777,965
Inventories	909,616
Investments, including affiliated companies	472,829
Fire insurance and workmen's compensation funds	126,444
Deferred charges	673,872
Total	$21,717,847

Liabilities

Capital stock, represented by 31,500 no-par shares $7 1st pfd. (to be issued). 57,500 no par shares $7 2nd pfd. (to be issued). 203,000 no-par shares common (to be issued), and Surplus at organization	$11,405,691
First mtge. 6% bonds (to be issued)	$ 7,000,000
Accounts payable	232,379
Accrued federal tax	230,058
Other accruals	184,076
Purchase money obligations.	1,373,760
Ground rentals payable	365,000
Leasehold purchase contracts	752,000
Reserve for fire insurance, workmen's compensation, etc.	174,883
Total	$21,717,847

Canada Cement Issues Annual Report

This Canadian producer of portland cement, which operates factories at seven points in Canada with a total production capacity of about 12,000,000 barrels annually, has just published its annual report for the fiscal year ended November 30, 1929. It is said that the company handles approximately 80 per cent of the total Canadian cement business, as well as some export business.

Canada cement is understood to have unlimited deposits of limestone, gypsum, clay—the raw products used in the production of cement. In June, 1929, the reconstruction of the Hull, Quebec, plant was completed and operations began. During the year, the company acquired properties for storage and shipping to St. John, Halifax and Quebec which will be used to provide better service and more economical distribution of products along the eastern seaboard. Storage bins and packing plants were completed during the year at Halifax and Quebec, and similar equipment will be built at St. John during 1930. These storage and shipping plants should enable the company to compete more successfully with the European cement producers who enjoy lower labor costs and low ocean-freight rates.

Earnings of Canada Cement Co., Ltd., for the past two fiscal years are shown in the table below:

Years ended November 30	1929	1928
Operating income after depreciation	$3,171,115	$3,074,900
Bond interest	1,100,000	1,100,000
Federal tax and contingency	250,000	230,000
Fire insurance reserve	154,519	152,950
Reserve for sacks outstanding	.....	150,000
Reserve for extraordinary renewals	25,000	25,000
Accident reserve	24,500	20,000

CURRENT DIVIDENDS

COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE
Alpha Portland Cement	Common	$.75 qr.	Dec. 30	Jan. 15
Atlas Portland Cement	Preferred	$.66⅔ qr.	Dec. 21	Jan. 1
American Aggregates Corp	Preferred	1¾% qr.	Dec. 20	Jan. 1
Boston Sand and Gravel	Preferred	$.87½ qr.	Dec. 22	Jan. 1
Boston Sand and Gravel	Common	$.40 qr.	Dec. 22	Jan. 1
Calaveras Cement Co	7% Pfd.	1¾% qr.	Dec. 30	Jan. 15
Canada Gypsum and Alabastine	New stock	$.37½ qr.	Dec. 14	Jan. 1
Cleveland Builders Supply	Common	$.50 qr.	Dec. 15	Jan. 1
Consolidated Oka Sand and Gravel	Preferred	1¾% qr.	Dec. 27	Jan. 2
Coronet Phosphate Co	.....	$2.00 qr.	Dec. 14	Jan. 1
Dolese and Sheperd	.....	$2.00 qr.	Dec. 20	Jan. 1
Dufferin Pav. and Crushed Stone	7% 1st Pfd.	1¾% qr.	Dec. 16	Jan. 1
Ideal Cement Co	Common	$1.75 qr.	Dec. 13	Jan. 1
Illinois Brick	.....	$.60 qr.	Jan. 1	Jan. 15
International Salt Co	.....	1½% qr.	Dec. 16	Jan. 1
Johns Manville	Preferred	1¾% qr.	Dec. 12	Jan. 2
Johns Manville	Common	$.75 qr.	Dec. 26	Jan. 16
Kelley Island Lime & Tr	.....	$.62½ qr.	Dec. 20	Jan. 1
Kentucky Rock Asphalt	Common	$.40 qr.	Dec. 15	Jan. 1
Laclede Clay Products	Preferred	1¾% qr.	Dec. 29	Jan. 1
Lehigh Portland Cement	Preferred	1¾% qr.	Dec. 14	Jan. 1
Limestone Products	7% Pfd.	1¾% qr.	Dec. 15	Jan. 1
Medusa Portland Cement	Preferred	1½% qr.	Dec. 25	Jan. 1
Medusa Portland Cement	Common	$1.50 qr.	Dec. 25	Jan. 1
Metropolitan Paving Brick	Preferred	1¾% qr.	Dec. 15	Jan. 1
Mineral Products Co	Pfd. "A"	$.20 qr.	Dec. 30	Jan. 1
Monolith Portland Cement	Preferred	$.40 S.	Dec. 14	Jan. 1
Monolith Portland Cement	Common	$.40 S.	Dec. 14	Jan. 1
Pennsylvania Salt	Common	$1.25 qr.	Dec. 30	Jan. 15
Pennsylvania Salt Co	Common	$1.25 qr.	Dec. 31	Jan. 15
Santa Cruz Portland Cement	.....	$1.00 qr.	Dec. 24	Jan. 1
Southern Asbestos	Common	$1.25 S.	Dec. 31	Jan. 15
Southern Asbestos	Common	$.25 ext.	Dec. 31	Jan. 15
Sterling Salt	Common	$.50 qr.	Dec. 24	Jan. 1
Superior Portland Cement	Class A	$.27½ M	Dec. 23	Jan. 1
United States Gypsum	Common	$.40 qr.	Dec. 14	Jan. 1
Warner Co	1st Pfd.	$1.75 qr.	Dec. 14	Jan. 1
Warner Co	Common	$.50 qr.	Dec. 30	Jan. 15

Net income	$1,617,096	$1,396,949
Preferred dividends	1,364,870	1,365,000
Preferred sinking fund	16,396	2,076
Surplus for year	$ 235,831	$ 29,874
Profit and loss surplus	265,705	29,874
Earned per share preferred (209,980 shares)	$7.71	$6.65
Earned per share common (600,000 shares)	0.42	0.05

The management states that continued activity in the building trade and sales of cement have been larger in practically all districts. Especially satisfactory business was done in the west, which enabled the company to make a price reduction in that district, whereas the prices in other districts were practically the same as during the previous year. That 1929 was an active one in the Canadian building industry is indicated by construction contracts which amounted to $544,000,000 for the first eleven months as compared with $453,000,000 for the same period of 1928.

A balance sheet as of November 30, 1929, reflects total resources of $51,644,000. Current assets are shown as $5,496,000 compare with current liabilities of $1,592,000, leaving a net working capital of $3,904,000, against $4,120,000 at the close of the previous fiscal year. Cash and call loans amounted to $2,234,000, an increase of $667,000. A new asset item on the balance sheet consisted of marketable securities amounting to $199,000. Accounts receivable of $1,053,000 reflected an increase of $84,000. Inventories experienced a substantial reduction amounting to $1,893,000 as compared with $2,924,000 on November 30, 1928.

Land, buildings and equipment, after depreciation, were valued at $38,988,000, a decline of $57,000. Investments in the St. Lawrence Land Company (owning the Canada Cement Building and other properties), and other investments were valued at $7,047,000, an increase of $2,319,000. Funded debt consisted of $20,000,000 in 5½ per cent first-mortgage bonds of 1947. This issue is rated Ba by Moody and are currently quoted around 99 as compared with a call price of 105 to 1932 with lower levels thereafter. The issue is secured by a first mortgage and charge on all the company's real and immovable properties, including lands, plants, buildings, machinery and equipment, and by first floating charge on all other assets. This issue is eligible for life insurance companies in Canada.

The 6½ per cent cumulative preference stock is selling at 95, as compared with a call price of 110.

The common shares of the company, which, as well as the preferred, are traded in on the Montreal and Toronto stock exchange, are priced at 17½, not being on a dividend basis. The capital structure of the company is such that a relatively good gain in net income would be rather fully reflected in per-share results.

Lehigh Portland Report Indicates Stability

Lehigh Portland Cement Co. has issued its pamphlet report for the year ended November 30, 1929, showing net income of $2,737,476 after depreciation and federal taxes, equivalent after dividends on the 7 per cent preferred stock, to $2.77 a share (par $50) earned on the 450,348 shares of common stock. This compares with $4,124,390, equal to $5.79 a share, on the common in the preceding year.

Income account for the year ended November 30, 1929, compares as follows:

	1929	1928	1927
Sales	$19,346,790	$23,522,906	$27,642,843
Costs	11,168,759	13,108,687	16,701,563
Depreciation, etc.	2,292,205	2,271,847	2,222,740
Expenses	3,569,781	3,866,982	4,221,720
Operating profit	$ 2,316,045	$ 4,275,390	$ 4,496,820
Other income	736,590	405,318	274,148
Total income	$ 3,052,635	$ 4,680,708	$ 4,770,968
Federal taxes	315,159	556,318	652,124
Net profit	$ 2,737,476	$ 4,124,390	$ 4,118,844
Preferred dividends	1,485,491	1,537,433	.....
Common dividends	1,124,066	842,024	1,574,611
Surplus	$ 127,919	$ 1,744,933	$ 2,544,233

There are a number of factors outside the control of the company which explain the decline in profits, notably the pressure of foreign competition along the Atlantic seaboard, lower cement prices, and a more moderate demand. The situation should be aided this year by large undertakings for roads and public works. It would also be considerably benefited by a fair duty on imported cement.

If the improvement program is translated into action, Lehigh Portland, one of the outstanding concerns in the industry should benefit materially from it. Earnings of the company during the past three years have been tapering off and, for the company's fiscal year which ended August 31, 1929, net income reported amounted to $3,676,051, equivalent to $4.81 a share on the 450,348 shares of $50 par common stock. This compares with a net of $3,814,393 or $5.07 on the common for the previous fiscal year. The company is in a good financial position, however, and has an impressive dividend record behind the stock.

International Cement

This corporation has just reported for ten months ended October 31, 1929 a net profit of $3,805,582 after depreciation and federal taxes, equivalent to $6.06 a share on 627,524 shares of no-par stock. For the ten months ended October 31, 1928 the net profit was equal to $6.15 a share on 618,826 shares.

Considerable unsettlement in domestic markets affected the company's income exhibit for the past few months and estimated earnings for the year of, approximately, $7.25 a share, will make a favorable comparison with 1928 in which year $7.90 was earned on the common stock compared with $6.90 in 1927. Production at the end of the year will be approximately 35 barrels of cement per share outstanding, against 26 barrels at the close of 1926.

Everything Set for Annual Crushed Stone Convention

We assume that every operator of a crushed-stone plant is planning to attend the Cincinnati convention of the National Crushed Stone Association, January 20 to 23, 1930. A splendid program has been arranged for each of the several sessions, and special provisions have been made to entertain the ladies.

So many excellent addresses and instructive reports are scheduled that the attention of attendants will be maintained not only throughout the stated sessions but at the luncheons and especially at the banquet to be held Wednesday evening.

Many important points will be presented in the reports by members of the several standing committees, in addresses by other members who are prominent in the industry, and in addresses by representative men in industries that are closely related.

A large attendance is predicted. No man who is associated with the industry should fail to attend if it is possible for him to go.

LEGAL INFORMATION FOR OPERATORS

Buyer Bound to Pay For Defective Used Machine

Generally speaking, the law implies that a seller shall deliver to a purchaser merchandise reasonably worth the purchase price. However, if the goods are second hand and the contract of sale is in writing, the law implies no guarantee *not* stated in the contract. This point of the law was clearly expressed in Brierton v. Anderson, 20 S. W. (2d) 313.

The facts are that a buyer and a seller entered into a written contract whereby the latter sold to the former one used excavator of caterpillar traction in good merchantable condition, with the shovel repaired so that it would be in good working condition. The written contract contained no guarantee except that the machine was in good working order. The seller made a few minor repairs on the machine before it was delivered, and afterward worked it for two days. The buyer was invited to be present during the demonstration, but failed to come.

Within a few days after the delivery of the machine, the purchaser complained that the excavator was worn out and refused to pay for it. The seller sued to recover the agreed purchase price.

The undisputed testimony proved that the buyer saw the machine and inspected it before he executed the written contract for the purchase of it. The testimony for the seller showed that the machine was repaired and was in working order at the time it was delivered to the purchaser.

Therefore, the court held the buyer bound to pay for the machine, stating the following important law:

"In the first place, it may be said that the contract of sale was in writing, *and a warranty of the condition of the property sold cannot be incorporated in the written contract by parol evidence.* This court has also held that the sale of a second hand article carries no implied warranty as to the quality, condition, or fitness for the purpose intended of such article, and this is especially true where the property is subject to inspection at the time of the sale."

Distinction Between Subcontractor and Materialman

While, in many respects, subcontractors and materialmen have similar legal rights to mechanics' liens, to secure payment for labor and material, yet it has been held that submaterialmen are *not* entitled to the same legal protection. This important phase of the law was clearly illustrated in the recent case of Indiana Limestone Co. v. Cuthbert, 267 Pac. 983.

The facts of this case are that a contractor entered into a contract with the board of education of a city for the erection of a school building. The contractor agreed to furnish the material and supply the labor necessary to construct and complete the school building in accordance with plans and specifications, and furnished a bond which guaranteed payment for the work of all "laborers, subcontractors, teamsters, teams and wagons employed on said work and for all material used therein."

The contractor entered into a contract with the Wichita Cut Stone Company to supply the stone called for in the plans and specifications, cut ready to be placed in the building. The stone company had no part in the construction of the building, but merely delivered the material after purchasing it from the Indiana Limestone Company, which prepared and shipped the stone ready to set in the school building.

The building was completed and the contractor paid the Wichita Stone Company, but the latter failed to pay the Indiana Limestone Company. This company filed suit against the bonding company to recover payment contending that it was legally a subcontractor entitled to a mechanic's lien on the building since the bond covered all material supplied for use in the building.

However, the court held the Indiana Limestone Company *not* entitled to payment under the bond, making the important distinction between a subcontractor and a seller of material, as follows:

"A subcontractor, that is, one who undertakes to construct some definite part of the building, in some sense represents the contractor, and he represents the owner of the building. He is known by all parties interested in the construction of the building, and in contracting with him he can be held to guarantee, if necessary, that he will pay for the materials and labor he uses in constructing his part of the building. The cases . . . make a distinction between a subcontractor and a materialman, and hold the contractor and his sureties liable for materials and labor furnished to a subcontractor, and *not* liable to the manufacturer or dealer from whom a materialman may have purchased his stock."

Contract Induced By Fraud Is Void

In Gloede v. Socha, 226 N. W. 950, it was disclosed that a woman leased a sand and gravel pit to her son for a term of five years. A competitive sand company employed a real estate agent to induce the woman to sell the property for $22,000. The agent falsely stated to the owner that he represented a fictitious buyer. The woman signed the agreement to sell the property and accepted $2000 as deposit.

Two days later, the seller's son discovered the competitor's employes removing sand from the land. He ordered them off, and placed a barrier across the entrance. He then asked his mother why the men were on the land, and reminded her that she had leased the land to him for five years, a fact which she had entirely overlooked in her excitement occasioned by the haste with which the real estate agent insisted on her signing the contract.

Soon afterward the woman notified the sand company that she rescinded the contract because it was secured by fraud, misrepresentations and undue influence. She returned the deposit and refused to complete the sale. The sand company sued to compel her to fulfill the terms of the contract. However, the court held the woman within her legal rights in refusing to sell the property to the sand company, stating the following important law:

"Plaintiff (sand company) as well as his agent, Blessinger, well knew that the misrepresentations, concealment, and deceit practiced misled the defendant (woman), and that, relying thereon, she was induced to sign the contract. Under the circumstances, the plaintiff (sand company) is chargeable with all of Blessinger's (agent's) misconduct and sharp practice in dealing with the defendant. . . . Consequently plaintiff is in Court with unclean hands."

Injuries Caused By Exploding Dynamite Cap

Generally speaking, contractors, quarry owners, and the like, are not liable in damages for injuries caused unauthorized persons who meddle with explosives, dangerous tools or other equipment.

For example, in Vining v. Amos D. Bridges Sons Co., 142 Atl. 773, it was disclosed that a firm's employee placed a large tool chest, containing tools and a few blasting-caps, on the property of a private landowner with the latter's consent.

Several days later the landowner's son opened the chest and took one of the caps and lighted it while holding it in his hands. He sustained severe injuries, for which he sued to recover damages. It is interesting to observe that the court held the parents of the boy not entitled to damages, saying:

"The boy's own rash act was the proximate cause of the accident. . . . It would be utterly unreasonable to hold that the defendant was bound to anticipate the plaintiff's (boy's) rash and mischievous conduct and the consequences of it."

When Municipality Is Liable For Payment

Generally speaking, persons who contract to supply material or perform work for a city must inform themselves of the authority of the city officials to make legal contracts.

For instance, in the recent case of Newberg v. Warren Co., 278 Pac. 96, it was disclosed that city officials contracted to pay for sand, gravel and rock from assessments levied on the property owners. Some of the taxpayers refused to pay the assessments and their property, which was valueless, was advertised but no buyers were found and the city took over the property.

The seller sued the city for the balance due on the account, but for the reason that the city charter specified that money for similar purposes should be obtained by levying assessments against the property owners, the court held the city not liable for payment if the money could not be obtained from the assessments. This court said:

"The city did not guarantee that the property levied against would, at public sale, bring the full amount of the assessments. It only contracted to 'set the legal machinery in motion' and to exercise reasonable diligence to obtain funds with which to pay the warrants issued. . . . The seller was bound to take cognizance of the powers vested in the city by its charter."

Employer Not Liable For Injury Caused By Negligent Motor-Truck Driver

The law is well established that a motor-truck owner is not liable for an injury caused by a careless driver, if the injury occurs while the driver acts in disobedience to the expressed or implied instructions of his employer. This is particularly true if the driver deviates from his shortest route *for his own purposes.*

For illustration, in Greenberg v. Lotz Asbestos Co., 146 Atl. 834, it was disclosed that a motor-truck driver's employment ceased at noon on Saturday. Shortly before noon the driver started to take the truck to the garage. Instead of going there directly, he deviated from the shortest route from his employer's warehouse to the garage, went to his home, changed his clothes and then at 1 p. m. re-entered the truck and, when driving carelessly and recklessly toward the garage, he negligently struck and seriously injured a pedestrian who sued the employer for damages.

In view of the fact that the injury occurred when the driver was acting in disobedience to his employer's implied instructions and had deviated from the shortest route from his employer's warehouse to the garage, the Court held the employer not liable, stating the following important law:

"The rule is that for all acts done by a servant in obedience to the express orders or directions of the master, within the scope of his employment, and for acts in any sense warranted by the express or implied authority . . . the master is responsible; for acts which are not within these conditions the servant alone is responsible. . . . A deviation by the servant from the scope of his usual employment, when done by the express or the implied direction of the master for his business, will *not* relieve the master from liability for the negligent act of the servant, since he has extended the scope of the servant's employment to the new business. . . . When the servant is using the automobile for his own purposes, and without the master's permission or consent . . . no liability attaches to the master for the servant's negligent operation of the car during this period."

Legal Duty of Automobile Drivers

Few persons realize that drivers of motor vehicles are bound at all times and under every circumstance to exercise care to avoid injury to themselves and others. Moreover, it is important to know that the fact a person disobeys a law does not relieve another from liability for negligently effecting an injury to him. Nor may a negligent driver recover damages for an injury to himself sustained as a result of a collision with another vehicle whose driver is disobeying the law.

For example, in Callahan v. Bridges Co., 147 Atl. 423, it was disclosed that a self-propelled steam shovel was traveling on the left side of a highway. An automobile owner, traveling from an opposite direction attempted to pass the shovel on its right side and collided with it. He sued the owner of the shovel for damages, contending that the latter was liable solely because he was operating the shovel on the wrong side of the highway. However, since it was shown that the automobile driver could have observed the shovel at a point eight hundred feet before he collided with it, the higher Court reversed the lower Court's decision in favor of the automobile owner, and said:

"The plaintiff (automobile owner) takes upon himself the burden of establishing, not only the negligence of the defendant, but that the plaintiff himself was free from any contributory fault. The fact that the steam shovel is shown to have been on the left side if the road raises a prima facie presumption of negligence. . . . The plaintiff (automobile owner), in the exercise of common prudence, reasonably could have seen the steam shovel on the wrong side of the street, it was then 760 feet, in unobstructed view, ahead of him. . . . Care and vigilance on the part of vehicular travelers should always vary, according to the exigencies which require vigilance and attention. An automobile driver is bound to use his eyes, bound to see reasonably that which is open and apparent, and take knowledge of obvious dangers. When he knows, or reasonably ought to know, the danger, it is for him to govern himself suitably. Thoughtless inattention on the highway, as elsewhere in life, spells negligence."

Mechanic's Lien Invalid If Seller Fails to Prove Facts

Where either a contractor or a material man furnished material simul-

taneously for two or more buildings, he is bound to prove that the material was used in the construction of the building on which a mechanic's lien is claimed.

For instance, in Favrot Co. v. United States Fidelity Co., 123 So. 593, where a material man supplied material to a contractor who was constructing two buildings, the Court refused to uphold a mechanic's lien claim because he did not prove that the material involved in the suit actually was used in the building on which the lien was filed. The Court said:

"There are two separate and distinct contracts for the construction of two separate and distinct buildings, each contract covering its own particular building, described and referred to therein. . . . Mere proof of materials furnished the contractor for the two distinct buildings is not sufficient."

Employer Liable for Contract Made By Employee

An employer who accepts the profits from an act of his employee is bound by the agreement thus made. Therefore, although an employee is not authorized to make valid contracts, the employer is liable on the contract if he fails to notify the other party that he rescinds the agreement.

For example, in Lakeside v. Duvall, 19 S. W. (2d) 1107, an employee orally promised to pay a motor-truck owner for hauling rock, sand and gravel. After the owner of the truck had hauled considerable of the material the employee's employer refused to permit him to continue to haul. The owner of the truck filed suit against the employer to recover damages and the profits he lost.

The employer testified that his employee had no authority to make a valid contract for hauling sand and gravel, and that all such contracts were made in writing and that the haulers are required to furnish bonds.

However, since the employer was benefited by the hauling, the Court held the hauler entitled to a judgment and stated the following important law:

"Apparent authority in an agent is such authority as the principal knowingly permits the agent to assume, or which he holds the agent out as possessing; such authority as he appears to have by reason of the actual authority which he has; such authority as a reasonably prudent man, using diligence and discretion. . . . One dealing with an admitted agent has the right to presume that he is a general agent clothed with authority coextensive with its apparent scope, and that an agent acting within the apparent scope of his authority, though in violation of specific instructions, *may bind his principal in dealing with one who has no notice of the restrictions upon the agent's authority.*"

This is an important case because, ordinarily, the employer is not liable for the unauthorized acts of his agent, unless he has knowledge of *all* material facts relating to the contract. However, where the employer is benefitted from the unauthorized acts of his employe, he is deemed to *have knowledge of the transaction*, providing the circumstances indicate that he knew or should have known the intentions of his agent.

MANUFACTURERS' PUBLICATIONS

Each publication listed below contains information of interest to non-metallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY *when making such requests.*

Boilers

The Largest Steam Generating Units in the World. 8 p., 7 ill. (Combustion Engineering Corp., New York, N. Y.) Describes and illustrates a huge boiler installation at the East River Station of the New York Edison Co.

Classifiers

Kinetic Elutriation. (Kinetic Elutriators, Ltd., London, England.) A series of bulletins describing and illustrating foreign developments in sand classification.

Controllers

E. C. & M. Time-Current Control. 4 p., 9 ill. (The Electric Controller & Mfg. Co., Cleveland, O.) Describes and illustrates time-current control boards for cranes and hoisting machinery.

Crushers

Symons Cone Crusher. 24 p., 18 ill. (Nordberg Mfg. Co., Milwaukee, Wis.) A new catalog describing various sizes of crushers and illustrating their application in typical installations.

Drilling

"The Churn-pipe Boring Method." 2 p., 5 ill. (*The Dupont Magazine*, Jan., 1930. E. I. Dupont de Nemours & Co., Inc., Wilmington, Del.) Describes and illustrates a novel method of quarry drilling.

"The History of the Portable Well Drill." 2 p., 2 il. (*The Armstrong Driller*, Vol. 3, No. 8. Armstrong Mfg. Co., Waterloo, Ia.) Traces the development of the portable well drill from its conception in 1867 to the present day.

Drives

Texrope Drives. 28 p., 44 ill. (Allis-Chalmers Mfg. Co., Milwaukee, Wis.) Describes and illustrates the application of a patented rope-drive to the pit and quarry, and other industries.

Economizers

"Cutting Coal Bills with Fuel Economizers." 5 p., 3 ill. (*Black and White*, Feb., 1930. E. F. Houghton & Co., Philadelphia, Pa.) Describes and illustrates by charts the economies of fuel economizers in power plants.

Electrical Equipment

Engineering Achievements—1929. 36 p., 78 ill. (Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.) Describes and illustrates the outstanding installations of electrical equipment in 1929.

Piping

Fabrication of Welded Piping Designs. 88 p., 47 ill. (The Linde Air Products Co., New York, N. Y.) A handbook for the plant superintendent who seeks guidance in piping layout.

Scrapers

"Scraper Provides Easy Solution of Waste Sand Problem." 1 p., 1 ill. (*Sauerman News*, Dec., 1929. Sauerman Bros., Inc., Chicago, Ill.) Describes the application of a dragline scraper to waste sand removal.

Shovels

Bay City Shovels. (Catalog K-2, 20 p., 47 ill., and Catalog T-6, 24 p., 42 ill. Bay City Shovels, Inc., Bay City, Mich.) Describe and illustrate tractor and convertible shovels, showing the equipment in service and listing specifications.

Stokers

C-E Multiple Retort Stoker. 48 p., 52 ill. (Catalog MR-2, Combustion Engineering Corp., New York, N. Y.) A new catalog describing and illustrating a multiple retort stoker of comparatively new design.

Welders

Lincoln "Stable-Arc" Welder. (Lincoln Electric Co., Cleveland, O.) Bulletin S-1459A (4 p., 5 ill.) deals with a belt-driven type; Bulletin S-1931A and S-1935A (each 4 p., 3 ill.) with stationary platform types for a.c. and d.c. respectively; Bulletins S-1932A and S-1936A (each 4 p., 3 ill.) with portable truck types for a.c. and d.c. respectively; and Bulletin S-1964A (6 p., 5 ill.) with a gasoline-engine-driven type.

TRAFFIC NEWS AND COMMENT

Central Freight Association Hearing Dates

The public hearing dates (Tuesdays) for the ensuing year are as follows:

January	21, 1930
February	18, 1930
March	18, 1930
April	22, 1930
May	20, 1930
June	24, 1930
July	22, 1930
August	19, 1930
September	23, 1930
October	21, 1930
November	18, 1930
December	16, 1930

Exceptions

Public hearings dealing with rates on common sand and gravel, crushed stone and similar road building articles will be held before the C. F. A. Special Road Building Material committee at the regular meeting of said committee which will be held on Wednesday, the day following the general public dates listed above.

Sand, Gravel, Crushed Stone, Slag, Rubble Stone, Broken Stone and Chert

Southern Freight Association Docket No. 48,486 proposes the establishment of commodity rates in straight or mixed carloads, minimum weight 90 per cent of marked capacity of car, except when cars loaded to full visible capacity, actual weight will govern from Big Stone Gap and Glenita, Va., to N. & W. Ry. Stations, in Virginia, on the Pocahontas and Radford Divisions, also to Norton, Va.

Proposed rates are on basis of I. C. C. Docket No. 17,517 scale, but will not apply on bituminous rock or bituminous asphalt rock.

Phosphatic Sand or Clay

Southern Freight Association Docket No. 48,485 proposes the establishment of through per-net-ton rates on phosphatic sand or clay (fertilizer filler), ground or not ground, carloads, minimum weight 90 per cent of marked capacity of car to Buffalo, N. Y., as follows:

From—	
Bartow, Fla.	$8.60
Brewerton, Fla.	8.60
Dunnellon, Fla.	8.20
Juliette, Fla.	8.40
Newberry, Fla.	8.20

Present through rates are now based on Butler, Ga., combination.

Crushed Stone

Western Trunk Line Committee Docket No. 7,115 proposes new commodity rates from Swank, Iowa, to the following representative points:

To—	Present	Proposed
Laclede, Mo.	15½c	7c
Carrollton, Mo.	17c	8c
Chillicothe, Mo.	15½c	7½c
Cameron, Mo.	17c	8½c
Medill, Mo.	11c	4½c
Downing	12c	5½c
West Quincy, Mo.	11c	5c
Hurdland, Mo.	12c	6½c
Trenton, Mo.	15½c	7c
Pattonsburg, Mo.	17c	8c

Minimum weight 90 per cent of marked capacity of car, except when loaded to full visible capacity, actual weight, but not less than 40,000 lbs.

Present rates are Class "E."

Sand and Gravel

Central Freight Association Docket No. 23,537 proposed the establishment of rates per net ton from Columbus, Ohio, as follows:

To—	Present	Proposed
Sonora	$1.00	$0.95
Bridgeville	1.00	.95
Norwich	1.00	.95
New Concord	1.10	1.00
Cassell	1.10	1.00
Cambridge	1.10	1.00
Mineral Siding	1.10	1.00
Kipling	1.10	1.05
Kings Mine	1.10	1.05
Lore City	1.10	1.05
Gibson	1.10	1.05
Salesville	1.20	1.05
Quaker City	1.20	1.05
Eldon	1.20	1.05
Cochrane Mine	1.20	1.15
Barnesville	1.20	1.15
Tacoma	1.20	1.15
Speidel	1.20	1.15
Bethseda	1.20	1.15
Belmont	1.20	1.15
Lamira	1.20	1.15
Warnock	1.20	1.15
Glencoe	1.40	1.25
Maher Mine	1.40	1.25
Stewartsville	1.40	1.25
Neffs	1.40	1.25
Bellaire	1.40	1.25

Cement

Central Freight Association Docket No. 23,532 proposes establishment of rates in cents per 100 lbs. on cement, carloads, from Limedale and Mitchell, Ind., to various points in Wisconsin, of which the following are illustrative.

To—	From Linedale	From Mitchell
Menasha	16c	18½c
Antigo	18½c	20½c
Ashland	21c	23c
Eau Claire	19½c	20½c
Chippewa Falls	19½c	21c
Superior	22c	23c
Janesville	15½c	16c
LaCrosse	18½c	20½c
Menasha	16c	18½c
Appleton	17c	18½c

Cement

Western Trunk Line Committee Docket No. 7,108 proposes establishment of rates per 100 lbs. on Keene's Cement, carloads, minimum weight 60,000 lbs. from Sigurd and Gypsum, U., as follows:

To—	Present Rate	Proposed Rate
Albany	81c	71½c
Baltimore, Md.	78½c	69½c
Boston, Mass.	84½c	74½c
Buffalo, N. Y.	.....	72½c
New York, N. Y.	82c	72½c
Pittsburgh, Pa.	.....	68c
Rockland, Me.	84½c	74½c
Wheeling, W. Va.	.....	68c

Plaster

Southwestern Freight Bureau Docket No. 19,086 proposes rates in cents per 100 pounds carloads, minimum weight 30,000 lbs. from Acme, and Agatite, Tex., of which the following are illustrative:

Adams	25½c
Brighton	26½c
Canton	29½c
Dodd	29½c
Gilcrist	29½c
Hall	30½c
Kersey	29½c
La Salle	29½c
Masters	29½c
Narrows	29½c
Ovid	31½c
Peekham	29½c
Red Lion	31½c
Snyder	30½c
Weldon	29½c

Agricultural Lime

Central Freight Association Docket No. 23,498 proposes the establishment of rates in cents per 100 lbs. on agricultural lime, carloads, in some instances resulting in advances and in others reductions, from Scioto, Ohio, to various points in Ohio, of which the following are representative:

	Present	Proposed
Ashland	....	7c
Bedford	....	8c
Crestline	....	6c
Fostoria	....	8c
Lancaster	8c	11c
Loveland	....	10c
Martel	6½c	5c
Newton Falls	11c	8c
Ohio City	....	10c
Sandusky	....	7c
Washington C. H.	11c	10c
Zanesville	....	8c

Lime

Southern Freight Association Docket No. 48,440 proposes the establishment of a new line of rates on lime, common hydrated, quick or slacked, in bulk, or in packages, carloads, from Louisville, Ky., to all points on the Southern Railway, Louisville Division.

It is proposed to publish specific rates based on the mileage scale published in Section 4 of Agent Speiden's I. C. C. 1,250.

Lime

Trunk Line Association will hold public hearing at Room 401, No. 143 Liberty Street, New York, N. Y., Tuesday, January 21, 1930, at 10:30 A. M., regarding revision of rates on lime, lime ashes and limestone, carloads, from various points in New England territory to destinations in Trunk Line territory.

Gypsum Rock

Central Freight Association Docket No. 23,542 proposes the establishment of rates on gypsum rock, crushed (not ground) and gypsum rock, run-of-

mine, from Chicago to the following points opposite which are the present rates.

Cincinnati, Ohio	16½c
Evansville, Ind.	16½c
Jeffersonville, Ind.	16½c
Henderson, Ky.	18½c
Indianapolis, Ind.	14c
Owensboro, Ky.	21½c
Louisville, Ky.	17½c
New Albany, Ind.	16½c

The proposed basis is 83.33 per cent of Sixth Class Rate.

Feldspar

Southwestern Freight Bureau Docket No. 19,046 proposes to amend tariffs S. W. L. Tariff 14-M, naming rates to points in Texas and Oklahoma, by adding Roberts Spur, Colo., as a point of origin.

It is also proposed to publish rates in individual lines tariffs from Roberts Spur, Colo., to various destinations.

The following are illustrative:

To—		
Dallas, Tex.	$0.38½	cwt.
Fort Worth, Tex.	6.10	ton
Wichita Falls, Tex.	6.10	ton
Tulsa, Okla.	.30½	cwt.
Sand Springs, Okla.	.30½	cwt.
Ada, Okla.	.30½	cwt.

Western Trunk Line Committee Docket No. 4,129-J proposes rates from Roberts Spur, Colo.,

To—	Present		Proposed	
Joliet	$0.38½	cwt.	$0.34½	cwt.
Minneapolis	.38½	cwt.	6.25	ton
Miss. River Group	.30½	cwt.	5.80	ton
Peoria Group	.34	cwt.	6.80	ton
Chicago Group	.38½	cwt.	7.00	ton
Bastrop, La.	1.31½	cwt.	8.50	ton

The different rates both present and proposed are on minimum weights, some marked capacity of car while others are 40,000, 50,000 and 60,000 lbs.

Fuller's Earth

Texas Louisiana Tariff Bureau, Docket No. S-7,634 T. X. proposes to establish 16 per cent of first class rate, minimum weight 60,000 lbs., between points in Texas, interstate, also between points in Texas and Shreveport groups, and between Texas points intrastate.

This proposal is made to enable shippers to compete with the adjustment prescribed by the I. C. C. in Docket No. 20,133.

New Rates on Cement

Interstate Commerce Commission Examiner J. P. McGrath, in his proposed report in Docket 21,492 and related cases, having to do with rates on cement from the plant of the Dewey Portland Cement Company, Linwood, Iowa, and from other origin points to destinations in the West and Middle-west, proposes a readjustment of the present rate structure. With certain exceptions he proposes that the present rates from Linwood to destinations in Illinois, Wisconsin, Iowa, Missouri, Nebraska and Minnesota be found not unreasonable.

He finds that the intrastate rates from LaSalle, Oglesby and Dixon to Chicago are unduly preferential to cement manufacturers located at those points and unduly prejudicial to the Dewey Portland Cement Company.

He also finds that the interstate rates from LaSalle and Oglesby, Ill., Ilasco, Mo., and Mason City, Ia., to Wausau, Wis., are unduly preferential to cement manufacturers at points just mentioned.

The intrastate rates from Ilasco and Marquette, Mo., to St. Louis, Mo., and from Ilasco, Prospect Hill, Alpha, Marquette and Sugar Creek to certain destinations in Missouri are unduly preferential to the producers of cement at those points.

It is anticipated that exceptions to the examiner's proposed report will be filed by the various interested parties including the carriers. The matter will be set down for oral argument before the Interstate Commerce Commission during the early part of next year.

Hearing on Silica Sand Rates

Some time ago the Interstate Commerce Commission started a general investigation in regard to the rate structure on sand and gravel. The Docket No. 17,000, part 11, was instituted in pursuance of the Hoch-Smith resolution. The Commission has announced that further hearing will be held at Tulsa, Okla., on February 10, 1930, for the purpose of getting additional testimony on silica sand.

Commission Decides Fullers Earth Case

The Interstate Commerce Commission has announced its decision in Docket 21,268 in which it finds that the present rates on Fullers Earth from Attapulgus, Ga., Quincy, Midway and Jamieson, Fla., to points in the States of West Virginia, New York, Pennsylvania, Ohio and Illinois are not unreasonable or otherwise unlawful.

New Complaint

The Illinois Silica Sand Traffic Bureau of Chicago has filed complaint in Docket 22,907. It is claimed the carriers in Official Classification territory have failed to revise their rate on sand from points in the Ottawa district as well as from competitive shipping points and as a result the rates from the Ottawa district are unjust and unreasonable and unduly prejudicial.

The Complainant asks the Commission to prescribe just and reasonable rates to destinations east of the Illinois-Indiana state line as well as a uniform description of the commodity, sand, for rate application and classification purposes.

It also asks that the Commission prescribe a uniform formula to be used in arriving at distances.

Limestone

The Interstate Commerce Commission has given its decision in I. & S. Docket No. 3,288 involving rates on limestone from Alabama to southwestern territory.

Proposed increased carload rates on broken, crushed or ground limestone containing 2½ to 9½ per cent of asphalt from Memphis to points in Arkansas and in Louisiana west of the Mississippi river, on traffic from Margerum and Cherokee, Ala., found not justified.

The suspended schedules were ordered cancelled and the proceeding discontinued.

Percentage Allowance for Drainage on Sand and Gravel

The Western Trunk Lines, in their Docket 7,059, propose to establish a rule reading as follows:

"The following percentage allowance for drainage will be made on washed sand and gravel when weighed on privately owned track scales located at sand and gravel pits: Washed sand, 1 per cent; washed gravel, one-half per cent, except when covered by agreement with the Western Weighing and Inspection Bureau based on actual tests."

At the present time there is no general rule in effect.

Lime

The Central Freight Association carriers, in their Docket 23,236, propose to revise and increase the existing rates on lime, agriculture and fluxing, having no commercial value for chemical or building purposes, to Cincinnati, O., when destined to stations beyond Cincinnati from various producing points in Ohio.

The present and proposed rates are as follows:

From	Present	Proposed
Cedarville, O.	$0.08	$0.10
Gibsonburg, O.	.10½	.13
Woodville, O.	.10½	.13
Marble Cliff, O.	.09	.11
Marion, O.	.09	.11½
Tiffin, O.	.10½	.13

INSURANCE PROBLEMS DISCUSSED

Coinsurance

"Sure, I know what coinsurance is. It means that no matter how big a policy you carry, the insurance company will pay you only eighty cents on the dollar if you have a fire."

The foregoing sentence expresses one of the most widespread fallacies in the whole field of insurance. It is important because there is a "coinsurance clause" in the great majority of fire insurance policies in the entire country (excepting those covering residence property and household goods). If there is a coinsurance clause in your policies you are vitally interested in this subject, because a correct understanding of it will simplify the buying of insurance for you.

Definition

The coinsurance clause says that in return for a reduction in rate the insured agrees to carry insurance at least equal to a stipulated percentage (eighty per cent., for instance) of the value of property, or if he fails to carry enough insurance, he must stand a part of any loss himself in proportion to the deficiency.

If you own a building worth $10,000 and, supposing there is an 80 per cent clause in your policy, you carry $8,000 of insurance, you will collect in full on any loss up the face amount of your insurance, whether the loss is small or big. In other words, if you carry the required amount of insurance, every loss is adjusted just as if there were no such thing as a coinsurance clause. If, however, you carry only $6,000 on such a $10,000 building, you will collect only 6,000/8,000ths, or 6/8ths, of any loss, because you are carrying only 6/8ths of the required amount of coverage.

In other words, coinsurance may penalize the policy holder who, through ignorance, carelessness or deliberate intent, is underinsured, but it does no harm whatever to the intelligent business man. In fact, it actually furnishes a valuable key to the proper basis for buying fire insurance. In most states a property owner is permitted to get a policy without coinsurance, or with a clause stipulating practically any percentage of insurance to value. The rate varies, of course, being very low where the owner carries full insurance, and being quite high where the amount of insurance is admitted to be inadequate.

Maximum Loss

In buying your fire insurance do not accept without question a coinsurance agreement in your policy. Get your agent to tell you about the differences in rate and then decide what form is best for your interests. First of all, you should determine the insurable value of your property (this means the replacement cost at present market prices minus physical depreciation for age and use). Then estimate how much salvage would be left after the most severe fire that you can reasonably imagine. For instance, after a severe fire in a brick building the lower part of the walls will probably remain standing. This anticipated salvage may equal twenty per cent of the sound value. The maximum loss would then be eighty per cent of the value, and the correct insurance would probably be for this sum, with the eighty per cent coinsurance clause attached to the policies. In other words, you would have insured the full burnable value; you are fully covered—to carry less would leave you partly unprotected, and to carry more would give you some insurance on which you never could collect.

Frame Buildings

A frame building, on the other hand, may burn to the ground with no salvage, and the owner is not fully protected unless he carries policies equal to the entire sound value. In that case you can use either the eighty or ninety per cent clause. It is almost never advisable to use the one hundred per cent clause, for fluctuations in prices and differences of opinion as to building costs require some margin of safety. With fireproof structures there is always a chance of considerable salvage, but such liberal credits in rate are usually allowed on fireproof buildings that the eighty or ninety per cent clause ordinarily gives the most for the money.

In the case of machinery or contents of buildings, the principle is the same in choosing the coinsurance clause. However, there is rather little salvage to be anticipated, because even heavy machinery is liable to be warped and wrecked by great heat. Practically full coverage must be carried on most contents.

Fundamentally, coinsurance is for the protection of the conscientious insured. Its main purpose is to establish premiums on a basis that is fair to all buyers of insurance. Its basis is that all property owners will carry full insurance or pay an excess rate for any deficiency. On this basis it is possible to devise a rating schedule that measures the difference in fire hazard between machine shops, millinery stocks, and all other classes of business.

EFFECT OF COINSURANCE

The following situations illustrate the practical workings of coinsurance. In all of these cases it is assumed that the insurance covers a building worth $20,000 *and the policies contain an "*80 *per cent coinsurance clause," which requires the carrying of at least* 80 *per cent of* $20,000, *or* $16,000 *of insurance.*

	Amt. of Ins. Carried	*Amt. of Loss*	*Ins. Co. Pays*
1.	$12,000	$ 6,000	$ 4,500
2.	16,000	16,000	16,000
3.	16,000	18,000	*16,000
4.	20,000	20,000	20,000
5.	16,000	4,000	4,000

**The payment can never exceed the face amount of the policies, regardless of coinsurance.*

Look Them Over

Do you use ladders? If you do, LOOK THEM OVER. A weak or broken rung may cause a nasty fall. Bad sides often cause ladders to collapse. The absence of safety feet suitable for the floor on which a ladder is to be used may be responsible for its slipping. If you want to use ladders with safety get the LOOK THEM OVER habit.

How about the machines you run? Do you keep them clean? Are they properly oiled? Are the belts correctly adjusted? Are all guards in place? To avoid accidents on machines always LOOK THEM OVER before you put them in operation.

G. V. Wood, formerly located at the Highbridge plant of the Taylor-Wharton Iron and Steel Company, is now western sales manager for Taylor-Wharton Iron and Steel and Associated Companies. Mr. Wood's headquarters will be in San Francisco.

REVIEW OF FOREIGN PRACTICE

Scoop-Arm Machines; Friction Clutches

Relates to reversing mechanism formed as a unitary structure and arranged on the jib of a scoop-arm excavating machine, whereby the longitudinal movements of the scoop arm may be controlled independently of the control of the prime mover. A prime mover on the superstructure of the machine drives, as through a chain 25, Fig. 1, a sprocket 24 loose

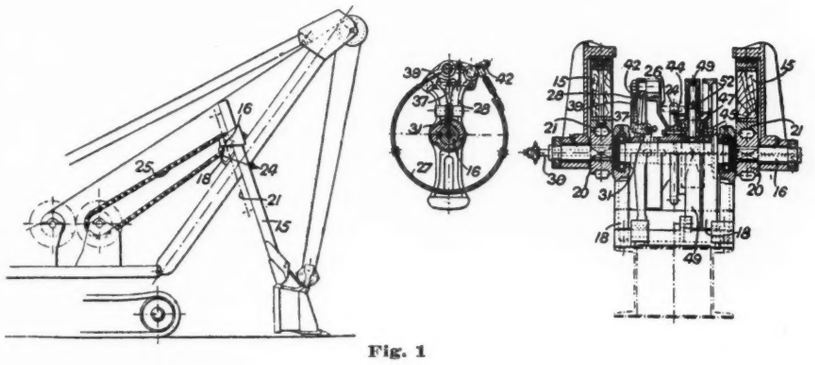


Fig. 1

on the shaft 16, which may carry the pinions 20 engaging the racks 21 on the scoop arm, or may be geared to the shaft carrying such pinions. The sprocket 24 is secured to a clutch flange or drum 26, surrounded by a clutch band 27, carried by a balanced frame 28, keyed to the shaft 16; the clutch band is applied by means of an axial rod 30, acting through a bell crank 31, link 37, toggle 39, and bell crank 42, whereby the scoop arm 15 is moved longitudinally in one direction. Motion in the other direction is obtained through reversing gearing comprising bevel sun gears 44, 45, secured to the sprocket 24, and a brake flange 52, respectively, the gear 45 being also keyed to the shaft 16; bevel planet pinions 47 engage the sun gears 44, 45, and are rotatably carried by a brake flange 49, motion being communicated to the scoop arm when a brake band is applied to the flange 49, while the scoop arm is locked when a brake band is applied to the flange 52. These brake bands and the clutch band 27 may be controlled from a single lever. The clutch, reversing gear and brake are supported by a single base block etc., 18, to form a single unit. Spur sun and planet gear may replace the bevel gearing. W. Savage and Ruston & Hornsby, Ltd. (British Patent 317,718.)

Jigging Conveyers

In a jigging conveyer the end section 1a carrying the shovel 2, Fig. 2, is slidable on rollers 9 mounted on the adjacent section 1 and is held in any position by clamps 20, 21, actuated by a lever 14. The rollers 9 are mounted on standards 7a, at the ends of a transverse bar 7 secured to the section 1. Each standard is braced by a bar 10 secured to a block 11a on a shoe 11, which is secured to the section 1 by a bolt 12 passed through the blocks 11a, 11b, and a standard lug 13 on the section. The block 11b is secured to the shoe and also to the bar 7. The bail-shaped lever 14 is pivoted at 15 to the standards 7a, and at 17 to links 16, which are connected to swinging members 18, carrying the clamps 20, 21. The members 18 are pivotally connected to a bail-shaped lever 19, and also are connected to it by springs 26, which are under tension and cause the lugs 25 firmly to press on the links 16 and hold the lever 14 against unlocking movement. If the parts are in the position when the edge of the shovel is arrested suddenly, the levers will swing upwards and forwards, and the clamps will be freed, thus allowing the section 1 to advance with respect to the section 1a. Release of the clamps is ensured by providing on each standard 7a a cylinder 28, closed by a cap 29 and containing plungers 30, 31, between which is interposed a spring 32 or other cushion. The stem 30a of the plunger 30 bears against the clamp 30. The initial tension of the spring is varied by adjusting the threaded rod 31a, which bears against the plunger 31. If it is desired alternately to effect the release and engagement of the clamps during successive movements of the conveyor in order to advance the shovel, the lever 19 is placed in position 5, the lever 14

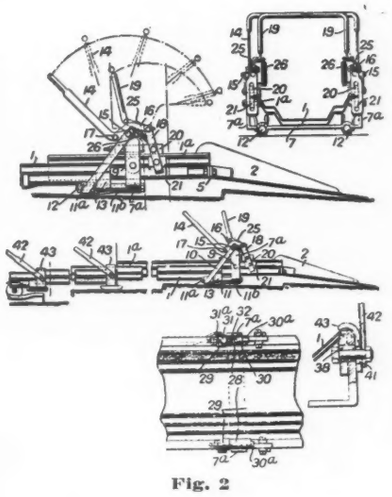


Fig. 2

is moved to position 2 and is held there during the movement of section 1 towards section 1a, and is then moved to position 1 and is held in that position during the movement of the section 1 away from the section 1a, which remains at rest. Adjacent sections of troughing may be clamped together by a hood 43, actuated by a lever 42 and eccentric members 33, 41. C. A. Jensen. British Patent 317,896.

Grinding by Impact Pulverizers

In a pulverizer having oppositely rotatable blade-carrying elements or shrouds A, B, Fig. 5, the pulverized material is withdrawn by a fan D or the like through ducts 5^b disposed nearer the axis of rotation than is the pulverizing zone between the blades.

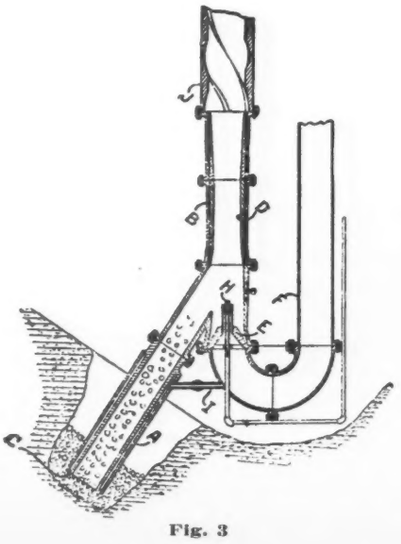


Fig. 3

The blade-carrying elements are dish-shaped and are slotted at 9^a to receive the blades 2^a which are secured to lugs at 8^a. The blades are radially inclined and are parallel on opposed discs so that the material is projected from one set of blades to the other as the discs rotate in opposite directions. W. W. White. British Patent 318,375

Grab and Scoop Arm Machines

The main boom 9, Fig. 4, of an excavating machine carries supporting means for a dipper stick 21 and an auxiliary boom is telescopically arranged in the main boom and carries a pulley 36, the auxiliary boom permitting the machine to be used as a crane or as a drag-line or grab ex-

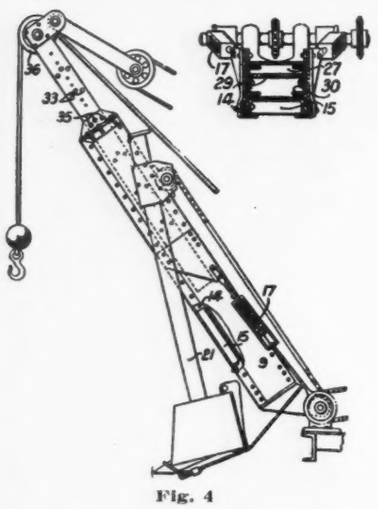


Fig. 4

cavator, etc. The auxiliary boom is built of a central angled piece 29 and end angled pieces 30, and is held in adjusted position by bolts 35 engaging one of a series of sets of openings 33. The main boom is provided with spring braces 17 and is constructed of angled plates arranged to provide a hollow space 27 to receive the auxiliary boom and guide channel 14 for a sliding weight 15, employed with a grab-bucket to prevent entanglement of the ropes. Sir G. C. Marks. British Patent 317,994.

Effect of Calcium Chloride On Cement

Cement or concrete mixed with a solution of calcium chloride sets more rapidly than when mixed with water, and, owing to the greater evolution of heat in the initial stages of setting, a more coarsely crystalline structure is obtained, resulting in higher initial tensile and compression strength. During ageing for 1-3 months the compression strength of cement mixtures containing calcium chloride increases more slowly than that of chloride-free mixtures, but is always 5 to 20 per cent greater. The tensile strength of the chloride mixtures, however, decreases appreciably after 1 month, and is finally less than that of water mixtures. Calcium chloride is a suitable addition agent for cement mixtures made in frosty weather, owing to the rapid setting and heat evolution produced. C. R. Platzmann (*Chem-Ztg.* 1929, 53, 477-478, 494-496). B. C. A.

Excavating by Suction

Sand and gravel are excavated from subaqueous deposits by inserting a suction conduit to a sufficient depth within the mass to maintain a substantial seal around the mouth thereof and reducing the back pressure within the conduit, whereby the material is lifted therein by the pressure of the overlying water. Jets may also be applied round the mouth of the conduit. As shown, Fig. 3, a suction conduit A depends from the delivery pipe B and the latter contains a Venturi tube D with a throat

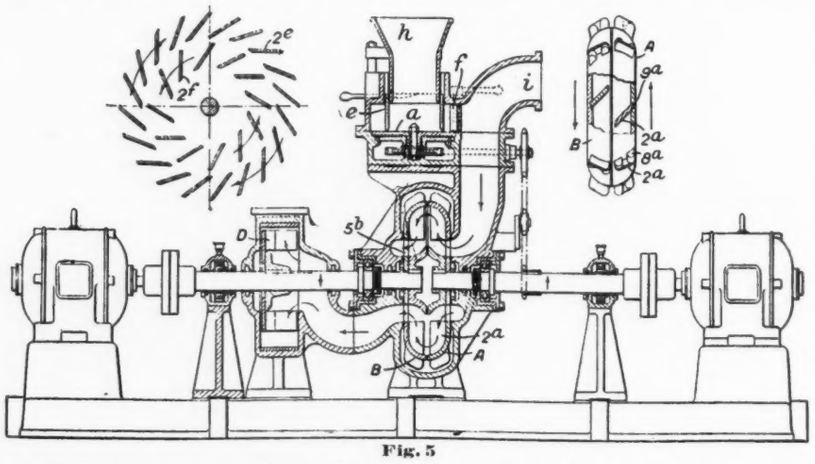


Fig. 5

of a diameter equal to the internal diameter of the conduit A. Water passes from a conduit F through a nozzle E to eliminate back pressure in the conduit A. Some of the water passes through a pipe I and the hollow wall of the conduit A to jets C to assist in loosening the material. An inner nozzle H may be supplied with compressed air to assist the action. The conduit A may be moved laterally during operations. The delivery pipe B may have rifling J. F. L. Ward. British Patent 318,355.

Electric Kiln for Manufacturing Cement and Lime

Powdered raw material is delivered by plates, arranged inside a shaft, into a chamber wherein it is fused between electrodes. Waste gases from the chamber are baffled by the plates and pass through a rotary preheating tube into which the charge is initially fed, and which has holes at one end and around the circumference to allow preheated raw material to be discharged into the pulverizer. H. J. Benham (British Patent 316,715). B. C. A.

Manufacture of Sorel Cement

A mixture of a ballast material with magnesia and magnesium chloride is incorporated with an emulsion containing a water-proofing substance which does not affect the setting properties, and the emulsion is coagulated by the subsequent addition of a suitable reagent. H. S. Lukens, Assr. to Solidon Products, Inc. (U. S. Patent 1,724,945). B. C. A.

Manufacture of Plasters from Anhydrite

By adding to anhydrite the component inorganic salts which constitute the double salt used in the prior patent, the setting time of the plaster is modified. Thus up to 2 per cent of zinc sulphate and up to 4 per cent of potassium sulphate may be added. V. Lefebure (British Patent 317,672). (Addition to British Patent 236,695.) B. C. A.

Packing Cement

The cause of the decomposition of packed cement is attributed to the formation of alkali carbonate. Addition of the maximum permissible quantity of gypsum is recommended as a preventive measure. The author does not share in views widely held, that paper sacks are responsible for this decomposition, but believes that this action occurs with other materials. Dampness appears to be the main cause, and cases or cylindrical containers made of oiled paper are recommended. K. A. Goslich (*Tonindustrie Zeitung*, Oct. 31, 1929).

LATEST NEWS FLASHES

American Stone to Build Plant at Lima, O.

The American Stone Corporation, which formerly owned and operated a plant at Delphos, O., transferred to the Erie Stone Company of Toledo, O., has purchased 28 acres of productive property at Lima, O. W. R. France, president of the company, who consummated the deal, proposes to build a plant that will cost approximately $100,000, to have an annual capacity of 200,000 tons. The Detroit, Toledo and Ironton Railroad will build a spur to the property.

Pine Bluff Sand Acquires Additional Property

The Pine Bluff Sand and Gravel Company, Pine Bluff, Ark., has acquired the plant of the Arkansas Sand and Material Company, near Pine Bluff on the Arkansas River.

Columbia Quarry to Build New Plant

Columbia Quarry Co., Syndicate Trust Bldg., St. Louis, Mo., will erect $75,000 plant at Bonne Terre, Mo., to quarry, crush, screen and prepare 500 tons of dolomite daily. Construction will be by the company's forces.

Idaho Portland to Erect Cement Products Plant

Idaho Portland Cement Co., E. J. Simons, president, Inkom, Idaho, proposes to erect a $100,000 cement products plant at Pocatello, Idaho, using raw materials from cement mill at Inkom. Roofing tile, drainage tile, water and sewer pipe, and building blocks will be manufactured at the new mill, which will employ about 50 men. The company has leased 25 acres of land for the site of the proposed plant.

Westinghouse Creates New Supply System

Nineteen wholesale electrical supply companies doing a total annual business of $60,000,000, with branches in sixty cities, have been organized by the Westinghouse Electric & Manufacturing Company into a single system under the name of the Westinghouse Electric Supply Company. Previous to the reorganization, these companies were owned by the Westinghouse Commercial Investment Company, a subsidiary of the Westinghouse Electric & Manufacturing Company, but conducted business under their own names and with their own corporate organization. Each unit will continue to carry on its business as it has in the past and with the same management.

One of the objectives of the new system is to secure greater efficiency in the distribution of electrical products and, to this end, central reserve warehouses are being established in Boston, New York, Syracuse, Philadelphia, Tampa, Detroit, Indianapolis, Chicago, St. Paul, St. Louis, Dallas, Los Angeles, Portland, and Seattle, which will serve all of the sixty houses and will make available for quick delivery a broader line of merchandise than it has been possible to carry in the individual warehouses. All houses will, however, continue to carry all electrical and radio merchandise in general demand, as heretofore. Headquarters are at 150 Broadway, New York.

Will Open New Florida Phosphate Mine

Development of a new mine near Bartow, Fla., as the principal project in a $500,000 expansion program by the Southern Phosphate Corporation will be started early in the new year, E. A. Pierce, manager of the properties, reports. The new mine will be equipped with the most modern of mining machinery, including special dryer equipment.

The company does both a domestic and export business in mining and shipping phosphate rock in all commercial grades.

Los Angeles Company Will Handle Krupp Metal

The Eccles & Davis Machinery Co., Inc., of Los Angeles, has been appointed sole California distributors for WIDIA metal, the super-tough material made especially for high-speed tools.

France Company Erecting Plant at Logansport, Ind.

The France Stone Company recently incorporated a subsidiary to be known as the France Lime & Stone, Inc., to assume the operation of two properties at Logansport, Ind. A new crushing and lime plant is being erected.

Exhibited Crawler Shovel At Atlantic City Show

Link-Belt Company, of Chicago, exhibited its 1-cu. yd.-capacity, type K-30 gasoline shovel at the annual convention of the American Road Builders Association. Its exhibit was in space No. 321, Section C, on the main floor of the new Convention Hall, Atlantic City, N. J.

G. H. Olson, A. Eilersgaard, N. A. Weston and others from the Link-Belt organization were in attendance. Link-Belt Crane Agents from all parts of the country attended.

Literature illustrating and describing the Link-Belt line of machines was available. The *Link-Belt Shovel News*, a publication issued bi-monthly for those interested in news and applications of excavating machinery is being distributed.

Silo Company Expands

The Osakis Concrete Products Company of Osakis, Minn., has recently purchased the entire manufacturing equipment of the Fergus Falls, Minn., silo factory formerly owned by the Minnesota Cement Construction Company. The Osakis firm is installing steel tracks and cars in the plant and storage yards and a cable dragline at the sand-washing plant. This firm has one of the best equipped silo factories in the state and is doing a nice profitable business. Peter Rutten is president and manager.

Bricks Made From Stone Mill-Waste

Making building brick out of waste stone is a process invented by J. B. Newsom of Bloomington, an invention that probably will save much of the waste stone from mills and quarries and lower the cost of stone house facing from 15 to 20 per cent.

The first house from the new material had just been completed and is said to be striking in appearance.

Canada Cement Awards Contract

Canada Cement Co., Montreal, Que., Can., which recently decided to convert its No. 1 plant at Montreal from dry to wet process, will replace its raw mill and burning equipment almost entirely. F. L. Smidth & Company, New York City, has been

awarded the contract for the following: Four Unax rotary kilns complete with Unax coolers; five four-compartment Uni-Kom grinding machines, direct connected through Symetric drives to 900 hp. motors; agitators for complete system of slurry agitation, correction and storage; and a Skipulter.

Texas Gulf to Build New Plant

Texas Gulf Sulphur Co., Second National Bank Building, Houston, Tex., has awarded contract to Ingalls Iron Works, Birmingham, Ala., for 400 tons of steel to be used in construction of a new plant at Bowling, Tex.

Massachusetts Gravel Plant Destroyed by Fire

Fire of unknown origin caused damage of more than $15,000 when it completely destroyed the gravel plant operated by Gingris and Paradis at Methuen, Mass., on December 11. Among the equipment consumed by the flames, or damaged beyond repair, was a 50-ft. elevator, screens, three electric motors, conveyors, tool sheds and contents.

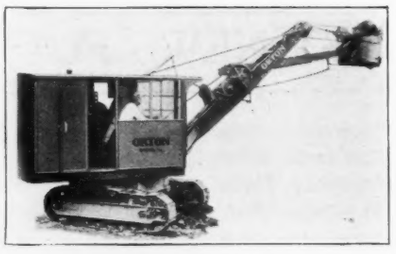
Canadian Corporation Merges Several Operations

The Canada Paving & Supply Corp., Ltd., Louis A. Merlo, president, Windsor, Ont., Can., has been formed to take over the following firms in Walkerville, Ford, Sandwich, Riverside, Tecumseh, Ojibway, Leamington, and Pt. Edward, Ont.; Merlo, Merlo & Ray; Essex Transit Co.; River Sand Brick Co.; Chick Contracting Co.; Chick Fuel & Supply Co.; Wm. Woollatt and Sons; Ryan Construction Co.; Cross Builders' Supply Co.; Premier Construction Co.; Border Builders' Supplies; Cast Stone Block and Machine Co.; and Windsor Sand and Gravel Co. Activities of parent company will be extended to other provinces than Ontario.

Orton Company Exhibited New Gasoline Shovel

The line of crawling-tread excavators manufactured by the Orton Crane & Shovel Co., Chicago was represented at the Road Show, booth 308 in the main auditorium, by a Model A1 ⅝-yd. shovel.

This machine is the first small-capacity excavator to be equipped with



Convertible gasoline shovel

a six-cylinder gasoline engine. The latter is of the standard heavy-duty type, rated at 56 hp. at 1400 r.p.m., and is connected to the operating mechanism by means of a roller-chain drive. Other interesting features of the machine are the positive gear-driven crowding mechanism, the self-cleaning spring-type crawling treads, and the cab construction which gives the operator a clear view on what is ordinarily the blind side of a machine.

The shovel can be converted to a crane, dragline, skimmer or ditcher, and one of the ditcher attachments will be exhibited. There also will be shown a Model E excavating clamshell bucket as typical of the Orton line of excavating and material-handling buckets.

Among the Orton representatives in attendance at the Road Show are: P. A. Orton, Jr., vice president and sales manager; and A. R. Whitney, of the Chicago office; S. R. Vanderbeck, of Philadelphia; H. W. Hegeman and John M. Connell, of the Mott & Mc Elrath Engineering Corp., New York; A. H. Krigger, of Pittsburgh; B. L. Whitney, of Detroit; W. D. Tulley, of St. Louis; Stuart S. Smith, of San Francisco; Leigh M. Railsback, of Los Angeles; Alex Orton, works manager, and F. D. Small, service engineer, of Huntington, Ind.

Salem Lime to Build New Plant

Salem Lime and Stone Co., Salem, Ind., which recently increased its capital from $30,000 to $100,000, will build and equip a plant for manufacture of mineral wool from stone deposits which have been tested and proven suitable.

Sugar Company Acquires Limestone Deposit

The Great Western Sugar Co., Billings, Mont., has acquired 160 acres of a limestone deposit at Sappington, Mont. Limestone will be quarried and calcined for manufacturing milk of lime.

Cummins Stone Leases Additional Quarry

The M. Cummins Stone Co., St. Louis, Mo., has leased a stone quarry near Columbia, Mo., from C. H. Taylor, Columbia. J. A. Cummins, who will have charge of the Columbia quarry, reports that $14,000 worth of equipment is being shipped from St. Louis.

Hawkeye Portland Installing Large Crusher

The Hawkeye Portland Cement Co., B. E. Manley, purchasing agent, Des Moines, Ia., is installing a crusher at its quarry. Work will be completed by early spring. Crusher will have a capacity of 2,000 tons per 10-hr. shift. An additional locomotive will be required to handle increased movement of cars, and a double-track outlet is under consideration.

Newaygo Overhauling Plant

The Newaygo Portland Cement Co., Newaygo, Mich., is overhauling its plant for next season's operations.

New Self-Lubricating Bearing

A new self-lubricating bronze bearing, said to be the only one of its kind, has just been announced by Johnson Bronze Company, New Castle, Pa., makers of bronze bushings, bronze bearings, bronze castings, cored and solid bar bronze.

According to P. J. Flaherty, president and general manager of the company, the new bearing provides a uniform area of bearing surface on the pressure line, and insures an efficient distribution of lubricating compound. The compound used is also a Johnson Bronze development.

Much interest has been evinced already, especially by the makers of machinery and of parts subject to intermittent or periodical operation, such as brake levers, clutch levers, shock absorbers, rocker arms, slow running journals, starting motors, landing gears, guide rollers, sliding door rollers and the like.

J. R. Van Rensselaer, formerly the sales representative with Taylor-Wharton's San Francisco distributor, is now located at the New York office of William Wharton, Jr., & Co., Inc.

Andre Klar, Ledec, Czechoslovakia, is building a cement mill at Heluan, near Cairo, Egypt. Danish capital is invested.

NEW MACHINERY AND SUPPLIES

Feeders and Conveyors

An interesting development of the Allis-Chalmers apron type, pan conveyor and feeder is shown in the illustration. It shows four of these feeders 26 in. by 23 ft. 3 in. centers. These are of the continuous overlapping pan type with overlapping ends on the pans. Two of these are used for limestone and two for granulated slag.

Another development in connection with its standard apron type device is shown. An illustration which shows the application of a direct connected motor drive to this machine, making a self-contained unit. The motor is of the enclosed fan cooled type, driving the feeder through a worm gear speed reducer connected to same with a bushing type flexible coupling. Variation in the speed is obtained through the ratchet drive mechanism of the feeder. This makes a compact unit which has been applied in several installations and can be used in connection with any Allis-Chalmers standard apron feeder.

New Crawler Crane

One of the important additions to the line of cranes manufactured by The Ohio Locomotive Crane Co. of Bucyrus, O., is Model TS. This model is a full-revolving crawler type shovel, crane, dragline and trench hoe. Features of the machine are the 16-ft. boom, International power plant delivering 30.4 hp. at 1000 r.p.m., all-steel fully enclosed cab and bronze bearings throughout. The crowd has power operations in both directions to shake sticky material from the bucket. This model is equipped with a ⅜-cu. yd. bucket.

Improved Table Feeder

A new Traylor product is a table feeder especially designed to be oil-tight and dust-proof. The table is made with three seal rings, engaging rings cast integral with the housing to prevent dust from entering the driving-gear chamber. The top of the table is protected by a heavy, renewable steel wearing plate. The base casting is machined to receive the housing and in the bottom of the gear chamber is fitted a Timken bearing to receive the lower end of the table shaft and take its thrust. The table feeder is worm driven, the worm being integral with the shaft, extended to both ends, so that the feeder may be driven from either side. There is a single

Group view of apron pan conveyors and feeders

scraper, ground on the bottom to fit the table, with screw adjustment. A telescopic steel feed pipe is used to regulate the feed, being provided with an operating lever, hand wheel and screw, and a stationary nozzle.

Electric Tower Excavator

For the building of levees along the Mississippi, Bucyrus-Erie has modified a machine which was first introduced many years ago for the Mississippi River Valley protection—the tower excavator. On this huge machine is a 10-cu. yd. bucket, handled from two machinery units known as head tower and tail tower.

Since the towers are separated by several hundred feet, the machine is enabled to make a wide shallow borrow pit with a pre-determined grade and to deposit its material in the levee in such a manner as to make a minimum amount of regrading necessary.

New Koehring Shovel With Enclosed Gears

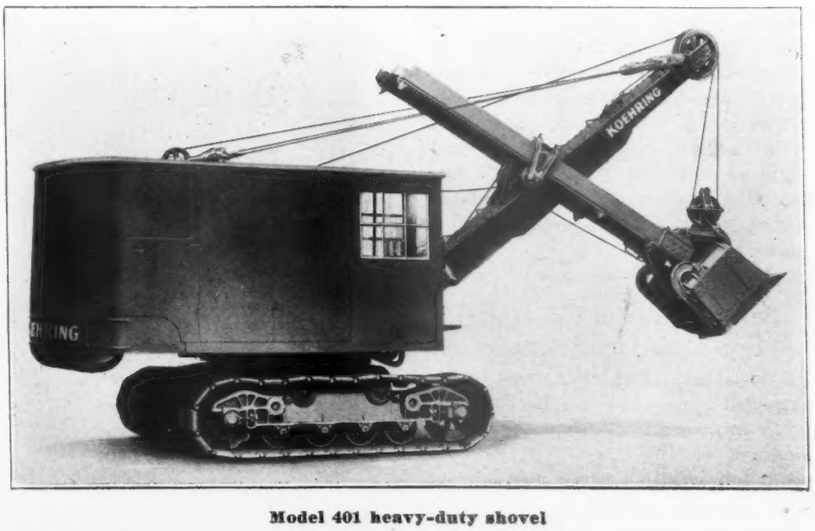
An outstanding improvement in design, which heretofore has not been incorporated in a machine of this type, is embodied in the Koehring No. 401 1-cu. yd. shovel-pull shovel-crane-dragline recently brought out by the Koehring Division of the National Equipment Corporation, Milwaukee.

All gears except the turntable gear and swing pinion are enclosed and run in oil. All the machinery shafts, which enter into the operations of hoisting, drag, dipper crowd, boom hoist and swing, are mounted on roller or ball type anti-friction bearings.

The Koehring No. 401 machine by a simple handy quick gear shift has available two speeds for all operations. A high hoist line speed of 206 ft. per minute giving fast snappy action to the dipper, or a lower line speed of 162 ft. per minute hoists the dipper with either two or three part cable reeve. A still slower speed for rock work if desired may be had through the use of a different diameter for the drum barrel. These features of speed change by simple gear shift gives the Koehring Shovel a wide range of efficient adaptability for different operating conditions. It also makes interchangeability between shovel, pull shovel, crane and dragline very easy and quick to effect.

The specially designed Koehring self-cleaning multiplanes and shoes will be found on the new model with the old tried and proven long life grease sealed roller bearings and shoes with welded wearing plates.

Other distinctive features of heavy duty construction which have made the Koehring an outstanding machine in the excavating and material-handling fields—the independent cable crowd, the shovel boom shock absorber, the double outside band self-



Model 401 heavy-duty shovel

equalizing friction clutches, the dragline boom point fairlead, the accident-proof traction lock, and positive steering arrangement from the cab—will also be found on this new 1-yd. machine.

Powered with a six cylinder Koehring-Wisconsin gasoline engine, 5¼-in. bore by 6½-in. stroke, which delivers 100 hp. (manufacturer's brake test rating) at 1075 r.p.m., the Koehring 401 has an abundance of reserve power to handle the peak loads. The engine is equipped with a Stromberg carburetor, Bosch magneto, Pomona air cleaner, Kingston governor, combination gas cleaner and AC fuel pump. The cooling system consists of a large size automobile-type radiator with a fan to blow the air away from the engine. Electric power is optional. The engine, upper machinery, counterweights and boom are all carried on the heavy steel turntable casting.

When built as a shovel, the new Koehring handles a 1-yd. dipper on 16-ft. dipper sticks. Equipped for crane work it has a capacity of 13 tons at a radius of 12 ft. with a 50 per cent safety factor; i.e., at a rating of 2/3 of the tested overturning load.

The new Koehring 401 model, with the operating gears enclosed in a large transmission case and running in oil, made its first appearance at the Road Show.

Detachable Watthour Meter

Detachable watthour meters for use either indoor or outdoor are now available, designed and put on the market by the Westinghouse Electric and Manufacturing Company. It consists of the standard temperature-compensated OB watthour meter housed in a weather-proof case. The manufacturers claim the meter has these advantages: (1) Plug terminals which make installation or removal easy; (2) Suitable for mounting in any location, outdoor or indoor; (3) Reduced labor, reading, and testing costs; (4) Completely iron-clad and tamper-proof; (5) Adjustable terminal block which permits mounting the meter with conduit entrance at top, bottom right or left; (6) Particularly adaptable to modern methods of conduit wiring employed in apartment buildings.

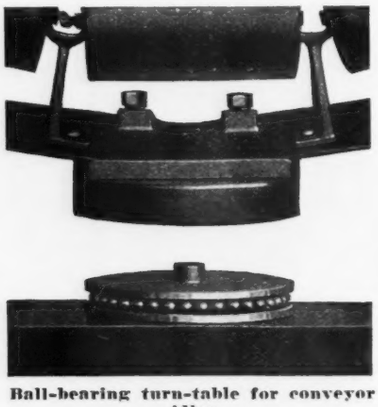
Self-Contained Controller For Low-Head Cranes

The General Electric Company has announced a new self-contained, triple-drum controller with a resistor mounted on the back, for the floor operation of the three motions of small, low-head cranes.

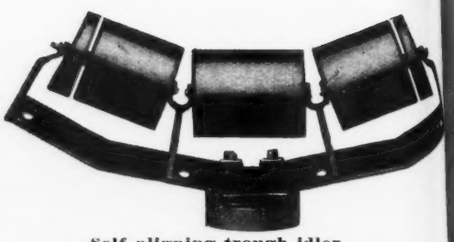
The general construction is similar to that of the standard General Electric line, with rope wheel having spring return, vertical or horizontal handle—all interchangeable. The horizontal handle arrangement is provided in case it is desired to install the controller in a crane cab for the usual method of manual operation. In such an installation the resistor can be separated from the drum switches, which is necessary if all three motors are rated the full ten horsepower rating of the controllers.

New Self-Aligning Idler For Conveyor Belts

An improved three-pulley trough idler for belt conveyors has been introduced by the Stearns Conveyor Co. The idler is similar to the one formerly manufactured by the company, except that counterweighted discs have been added at the outer ends of the concentrating pulleys. Any lateral movement of the belt from the center line of the conveyor will cause this self-aligning idler to rotate on the ball bearing turn-table, changing the angle of the idler with respect to the center line of the conveyor. This angular position of the unit guides the belt back to its normal position on the center line of the conveyor. The addition of the weighted discs at the outer ends of the concentrating pulleys provides added resistance to the belt when wandering from the center line of the conveyor, which greatly accentuates the centering action of the idler.



Ball-bearing turn-table for conveyor idler



Self-aligning trough idler

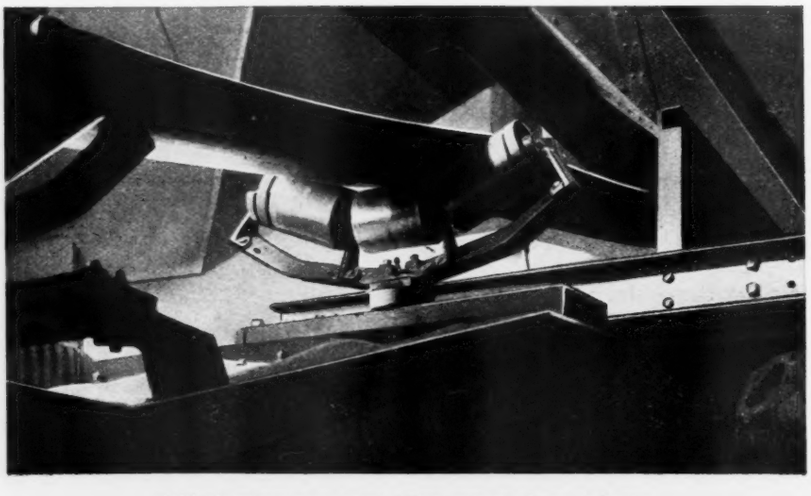
The installation of the Rex-Stearns patented self-aligning idler at certain spacing in the conveyor eliminates the necessity of any side guide idlers where difficult belt training is involved.

All of the pulley units in this self-aligning idler are of course Timken bearing equipped and carry all of the outstanding features of the entire Rex-Stearns line of Timken idler equipment.

Automatic Brakes Safeguard New High-Speed Hoist

A new type of high-speed hoist, equipped with emergency brakes which automatically set in case of power failure or other mishap, has been put on the market by the Lidgerwood Manufacturing Company of Elizabeth, N. J. The hoist is built in 100 hp. size for operation on a.c. current—either at 220 or 440 volts.

A number of improvements have been incorporated into the new hoist that make for efficient operation. The safety of the automatic brakes, however, is the main feature, according to the manufacturers.



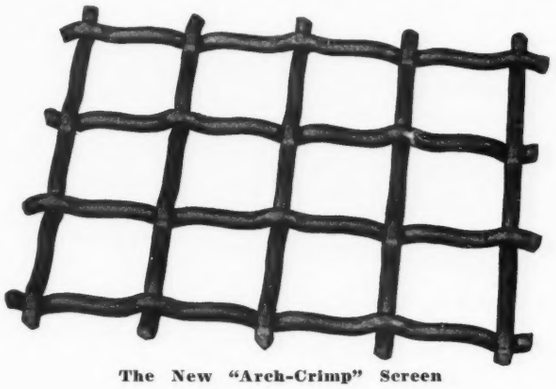
Self-aligning conveyor idler mounted on tripper

New Arch Crimp Screen

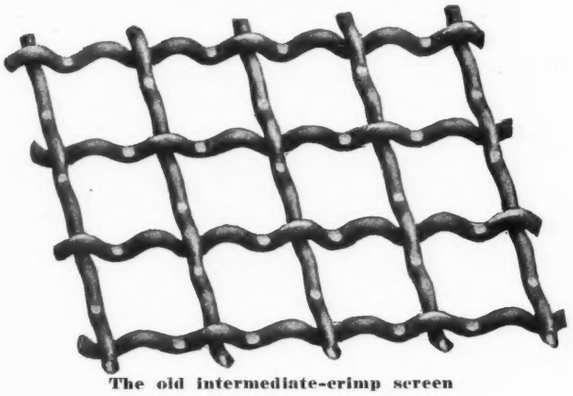
The Ludlow-Saylor Wire Co. of St. Louis has developed and is manufacturing Arch-Crimp Woven Wire Screens for coarse sizing.

Arch-Crimp is said to be an entirely new development in the weaving of wire screens of large openings. It is especially designed for severe service on vibrating screens and ideal for revolving screens. Arch-Crimp forms rigid cylinders and cones, which keep their shape and accuracy until the steel is worn away.

Arch-Crimp is considered a great advance over the old-style intermediate-crimp screen. Tension can not stretch Arch-Crimp; the wires resist extreme abrasion; the weave is tight and very rigid. There can be no "creep" between the wires, no bulging or sagging under load. trical systems.



The New "Arch-Crimp" Screen



The old intermediate-crimp screen

New Portable AggreMeter Plant for Loading Mixer Trucks

A new type of AggreMeter Plant for loading the various types of Mixer trucks—such as the Highway Truck Mixer, Paris Transit, Barrymore, Clinton, True Batch, and others—is now made by the Erie Steel Construction Company, Erie, Pa.

These new plants are built in two, three or more compartments of 25 tons capacity and up, for loading one-half to three cubic yard trucks.

The smaller type plants are shipped from the factory in two main sections and one top section, while the larger plants are shipped in large simplified sections which are quickly and easily erected.

The design of the entire unit is simple. Briefly, it consists of a self-cleaning bin, a self-cleaning accurate weighing AggreMeter, and a floating charging hopper.

Every ounce of material within the AggreMeter and charging hopper is active and enters the truck in a premixed condition.

It is easy to obtain accurate weight to within one pound with this AggreMeter, thus assuring uniform batches. batch of sand and stone in from twenty to thirty seconds. Each material is weighed on a separate beam, and an auxiliary dial shows the approach to the desired weight. Hand One operator can weigh and load a wheels control the operation of the bin gates; a trip rope opens the draw-off door which closes automatically.

The floating charging hopper prevents spillage. A different type is used for end loading than illustrated above. It can be moved out of the way for direct loading into trucks.

Many methods are in use for adding the cement. Most all of them are applicable to this new plant. Complete designs can be furnished for adding the cement.

The Erie Steel Construction Company also manufacture a complete line of AggreMeter plants for batching, central mixing, and material storage, as well as clamshell buckets for loading the bins.

A New Contact Cable

Bishop contact cable, a recent invention which promises to revolutionize near and remote machine control through an electrical mechanism both unique and practical in its possibilities was one of the magnet spots at the National Power Show in New York where crowds constantly watched the interesting demonstrations. Bishop Wire and Cable Corporation of New York, whose nation-wide operations date back to before the Civil War, is the producer of this contrivance.

The invention consists of a water proof, dust proof and acid proof cable about the size of an ordinary lead pencil, which, when compressed at any point in its entire length, throws a switch, turns on a light, sounds a signal or does a thousand things which formerly required direct contact with a button or switch at a given, stationary point. In other words the cable is one continuous switch along its entire length, whether it be 15 or 1500 ft.

The myriad of uses to which the cable may be put are limitless; in the home for electrical devices, lights, radios; in banks and other commercial places of business as a protection against holdups; in mines and other underground operations where, in an emergency, signal buttons may be at remote places; in power plants as life savers and time savers, and finally in automatic traffic control.

The cable has a novel type of construction. Two conductors, enclosed by the outside insulation, are left bare but separated from each other by an isolating cushion of rubber. When pressure is applied this isolating cushion yields and permits the outer conductor to contact with a wire which, in turn, is always in contact with the inner conductor, thus closing the circuit. When pressure is relieved the isolating cushion returns the outer conductor to its normal position. Used with a relay switch the cable becomes operative at the point of pressure—wherever the operator happens to be standing.

Model 411 Lightweight Sinker

This recent addition to the Gardner-Denver line weighs 39 lb. and offers to the trade a small drill of advanced engineering design and outstanding performance.

It is easy to operate, giving a high all-day drilling efficiency. A simple blowing device enables the operator to thoroughly clean all holes within the capacity of the machine. Rotation is accomplished by the use of a standard ratchet and rifle bar. The ratchet ring is reversible, which doubles the life of this part. A simple and effective steel puller which can be readily opened and closed by hand, and positively held in either position is part of the equipment of the machine. The back head, cylinder and chuck end are drop forged and heat treated for long service. All other parts are made from high grade alloy steels, heat treated, accurately machined and ground for long service.

A Light Traction Blast Hole Drill

In an industry of such age as that of well drilling, startling and new developments are hardly expected. The Chinese had percussion cable drilling tools before the days of Confucius.

Nevertheless, for 1930 production the Keystone Driller Co. is offering a blast hole drill with several new and distinctive features which are expected to meet the requirements of quarry superintendents and contractors to a degree not hitherto achieved.

The No. 1½ is lighter and lower in price than any Keystone traction well drill heretofore manufactured, but is designed to handle the heaviest desirable weight of drilling tools with a long and quick drilling stroke. Possibly the most striking feature of the new model is that the frame is constructed entirely of steel channels and angles, while the walking beams and derrick are of wood, the purpose of this combination being to gain the lightness and strength of steel framing while retaining the important resiliency and cushioning effect in the wooden beam and derrick members. Experienced well drillers know what destructive results follow the introduction of too great a degree of rigidity in a well drilling machine. Many a machine has run for years with manila line and, when equipped with the non-elastic wire cable, has wrecked itself in a few days. The No. 1½ is intended for use with manila cable, but can also be equipped with a spudding spring and cushion for use with wire line.

Light blast hole drill, mounted on rubber tires

All drilling machinery and shafting have been set low on the main sills while the front posts are shortened, the total effect being to achieve a low center of gravity and greatly increased stability so necessary in a small and light machine which is to be moved at times and for short distances with derrick erected.

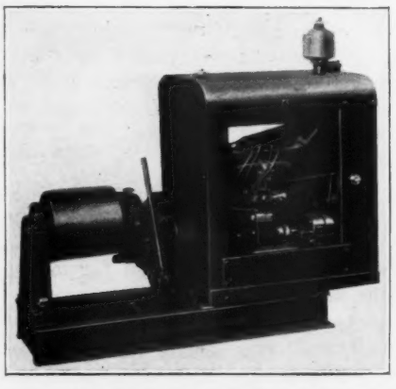
The machine is designed primarily for blast hole drilling and is equipped with iron tired wheels, cutter bands and cleats. But it can be furnished with rubber truck tires in addition for rapid movement over paved roads, if desired. It has three traction speeds forward and one reverse. High speed is about eight miles per hour.

The illustration shows the drill equipped with a 20 hp. 4-cylinder Waukesha engine. Electric motor is available for power, if preferred.

Design Power Unit To Drive Rock Crusher

A heavy duty power unit for powering a rock crusher has been designed by the Novo Engine Company. These power units consist of the new Novo 4-cylinder Rollr engines provided with an extended steel base and extended power shaft with an outboard pedestal bearing for supporting the extended shaft and wide faced pulley.

To take care of the heavy loads of the rock crusher which are bound to be irregular and jerky, the Novo Engine Company have hooked up the new 4-cylinder Rollr engine with a heavy duty wide face pulley and clutch, direct connected on the crank shaft. This arrangement has given an unusually light and flexible power unit that has proven to be practically without vibration. The crank shafts of these engines are mounted completely on anti-friction bearings. Timken roller bearings being used in the end position and a New Departure ball bearing in the center position. The engines are provided with handhole plates in the crank case, through which all adjustments on connecting rods and oil pump can be made without removing engine from its mounting or without destroying alignment. The carburetor and magneto can be furnished on either side of the engine. This is to have them on the accessible side of the engine away from the unit being operated. The pulley can be connected to gear reduction with clutch if so desired.



A heavy-duty power unit

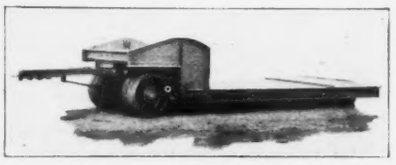
A New Time Recorder

Stromberg time recorders, equipped with telechron motors, are being announced by the Stromberg Electric Company as the latest development in the keeping of accurate time. The manufacturer calls attention to the fact that the most valuable commodity purchased by the operator or spent by the employees is time; consequently, it offers time recorders that automatically keep the most accurate time known to science—the time of the Naval Observatory at Arlington—without winding or regulating.

This time equipment is furnished in separate unit installations or any number of instruments can be combined and synchronized in one electrical systems. The separate unit installations are furnished with or without the telechron motor; the system is controlled either by the Stromberg master clock method or with a telechron motor in each instrument.

New Type of Industrial Trailer

A new type of trailer known as the Williams Arch-Girder trailer renders possible the carrying of heavier net loads without any increase in dead load. Its great strength is due to the unique mounting of the rear wheels, each of which turns on a short individual axle supported at both ends with no overhang. These wheels are carried, in pairs, in rugged cast-steel frames, each pivoted on a longitudinal axle, so that every one of the rear wheels is always kept in contact with the roadway. They have plenty of clearance, and do not foul the frame nor jam, even on the roughest road. Timken bearings, considerably larger than ordinarily used on trailers of the same rating, are a feature. The wide arch-girders at the front end are supported by two extra-heavy stiffening members, as extra insurance against buckling under severe stresses.



Heavy-duty trailer